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IT is reported that extensive deposits of phosphates have been discovered in Poland. English capitalists, it is said, are investing heavily.

IT is reported that a deposit of zinc ore has been discovered a few miles from the famous Friedensville mines, Pennsylvania. The latter are suffering from an increased influx of water. Should the new discovery prove all that is hoped for it, Eastern spelter production would receive a new impetus.

IN the editorial, "The New York Water Supply," in our issue of April 21st, page 218, last line but one of the article, please read, "a masonry dam **230** feet high." Those were the figures in the Editor's copy ; and they actually got into type as he wrote them ; but afterward, the cipher, not realizing its importance, dropped out.

THE Ohio Institute of Mining Engineers, an association formed within the past year, is exhibiting every sign of vigorous growth, under the progressive management of such officers as ANDREW ROY, President, and R. S. PAUL, Secretary. The next meeting, we are informed, is to be held on the 9th of May at Youngstown. A number of interesting topics are to be discussed.

MR. JAMES PARK, Jr., the great Pittsburg steel manufacturer, died suddenly of apoplexy on the 21st inst. He was born in Pittsburg on January 11th, 1820. He was first in his father's grocery and metal business ; but in 1843 built a copper rolling-mill. In 1862, the Black Diamond Steel-Works was erected, and Mr. PARK became one of the pioneers of the crucible tool steel trade. He was one of the most prominent and active of the members of the Tariff Commission, the work connected with it being the crowning effort of a busy life.

THE best indications of the capacity of the Spanish lead mines to work along under the prevailing low prices of the metal in the markets of the world is furnished by the reports of the English companies working there. According to the financial statement of the directors of the Linares, Fortuna, and Allamillos companies for the half-year ended December 31st, 1882, these companies did well, although the prices of lead ranged within the extremely low limit of £13 and £13 10s. The Linares made a profit of £2283, against £730 during the previous half-year ; the Fortuna ran its net returns up from £2454 to £3609 ; while the Alamillos declined from £4387 to £3666. In all cases, the cost of production was notably decreased, so that, if we should ever be forced to become exporters of lead, as some pessimists believe we must be in the early future, we should have to meet very low figures.

IT is announced that the Western iron manufacturers have decided to reconsider their recent ultimatum to reduce wages 10 per cent, and to afford the men an opportunity, on Thursday next, at a conference to be held at Pittsburg, to come to an understanding as to the scale to rule after June 1st. Any one who has followed developments in the finished iron trade during the first quarter of the present year will recognize that its position is, if any thing, worse than last year. There can be little doubt that we are, in the present condition of consumptive interests, suffering from over production, and a restriction, voluntary or enforced by a strike, is necessary, unless business is stimulated by low prices. It can not be expected that the manufacturers will bear the brunt of poor trade alone, and the sooner the men recognize this fact, the better. Their employers have much to gain and little to lose, while the men will be called upon to endure all the sufferings which idleness entails.

SLICKENS.

This word, probably brought into Cornwall by German miners, and signifying slimes (as its derivative, *slickensides*, signifies the smooth faces caused by the movements of rock-masses, and often covered with slippery clay), is now acquiring a portentous importance in the affairs of California. The great struggle between the hydraulic miners and the farmers of that State turns on *slickens*, which in this case is the *débris* of the hydraulic mines, minus the pebbles and boulders, or, in other words, the material carried in suspension by the rivers and re-deposited at lower points.

The following analyses of *slickens*, made for purposes of the pending litigation, are worth preserving :

	I.	II.	III.	IV.	V.	VI.
Silica	80·500	66·90	90·05	70·00	59·88	58·26
Oxide of iron	7·200	9·00	4·16	10·80	5·14	10·00
Oxide of aluminium	3·800	12·30	3·00	9·20	25·20	15·40
Lime	1·270	None.	0·90	1·52	0·87	1·83
Oxide of manganese	0·300	0·50	0·40	0·50	....	....
Magnesia	0·180	Traces.	Traces.	0·32	0·77	1·30
Potash	1·900	1·69	Traces.	1·71	1·44	1·14
Soda	Traces.	0·17	Traces.	0·90	4·96	0·10
Moisture at 100° C.	1·480	6·02	0·76	2·24	....	....
Water chemically combined	3·300	3·32	0·56	2·80	....	....
Phosphoric acid	Traces.	Traces.	Traces.	None.	....	0·18
Sulphuric acid	Traces.	None.	Traces.	Traces.	....	0·79
Specific gravity	2·580	2·31	2·66	2·60	....	....
Specific gravity (after washing)	2·584	2·46	....	....	....	....
Chlorine	....	....	....	....	0·06	....
Phosphorus	....	....	....	....	0·51	....
Sulphur	....	....	....	....	0·24	....
Water, organic matter and loss	....	....	....	....	0·93	11·00
	99·93	99·90	99·83	99·99	100·00	100·00

I. Sand from Gold Run mine, on bed-rock, sample taken October 19th, 1881, by P. M. RANDALL and W. A. SKIDMORE. Analysis by FALKENAU and RUSE. State Assayers.

II. Sand from Gold Run mine, 180 feet above bed-rock. Sample taken and analyzed as above.

III. Sand taken 300 feet above junction of North and Middle Forks of American River, October 20th, 1881. Analysts, etc., as above.

IV. Sand from American River, 200 feet above junction with Sacramento, taken October 21st, 1881. Analysts as above.

V. Slickens from the banks of the Sacramento. Analyzed by THOMAS PRICE.

VI. Slickens from Butte Co. Analyzed by H. G. HANKS.

These analyses are less valuable for the purpose in view than a thorough microscopic mechanical analysis would have been. Their principal sig-

nificance in the pending case is the proof they offer that the sands of the Gold Run mine contain little or no mica, while the sands taken near Sacramento contain a good deal. Mr. SKIDMORE writes: "In the course of the examinations which devolved upon me, I could not find any mining alluvium in San Francisco Bay or San Pablo Bay. We did not strike sand until we had passed the Straits of Carquinez. Near the old steamboat landing of Collinsville, on the Sacramento River, we first struck the invading sands; and here mica was predominant, showing it must have come from at least 100 miles distant, since there is no granite country nearer than Folsom and Auburn."

These observations show that the common talk of the injury done to San Francisco Bay by the mining *débris* is unfounded. The simple fact is, that the cultivation of the Sacramento and San Joaquin valleys, increasing as it does the amount of alluvium annually washed into those rivers, is largely responsible for the effects appearing below. But there is no doubt that, farther up the streams, lands have been injured or destroyed by the *débris* of the mines, though we think the extent of the damage has been overrated, and the spirit in which the mining companies are now pursued indicates on the part of the farmers the desire rather for plunder than for justice. Their demands have constantly grown with their successes; and nothing will now satisfy them but the entire suppression of the hydraulic mining industry.

The following summary of the history and present condition of this litigation will interest our readers:

The first case of importance was that of KEYES *vs.* Little York Company and thirty-eight other defendants, begun July 29th, 1876. After a long trial, wherein the best legal and engineering talent in the State was employed, a judgment was rendered against the mines. The case was appealed to the Supreme Court of California, where it was reversed on a point raised by demurrer, on the ground of misjoinder of parties defendant.

The city of Marysville then brought suit (September 15th, 1879) against the North Bloomfield Gravel Mining Company and thirty-two other companies. They included about 200 persons as defendants. The defendants appealed to the Supreme Court from the injunction issued in that suit and also demurred, and applied for change of the place of trial on the ground that the presiding judge was prejudiced. The motion was refused, and an appeal was taken to the Supreme Court, where it is now pending.

Then the State of California, by its attorney-general, brought an action against the Miocene Mining Company, of Butte County. This being a foreign corporation, the case was transferred to the U. S. Circuit Court for the District of California. Defendants demurred, the principal ground being the want of authority of the attorney-general to use the name of the State. The question was argued orally, and in addition briefs were filed and the matter submitted. Up to this time, Judge SAWYER has not rendered a decision.

Simultaneously with the above action, the attorney-general commenced suit (June 28th, 1881) against the Gold Run Mining Company of Placer County. Defendants, through the counsel of the Miners' Association, demurred and answered. The trial came on in October, 1881, and occupied the court sixty days. The presiding judge (TEMPLE) rendered a decision June 12th, 1881, sustaining the injunction, with a qualification that, on a proper showing of the construction of dams to restrain the coarse material, he would entertain a motion to dissolve the injunction. The point raised on demurrer as to want of authority of the attorney-general to use the name of the State was not decided, but referred to the Appellate Court. Neither party fully acquiesced in the decision. Defendants appealed to the Supreme Court, and plaintiff took a cross-appeal.

Then the county of Yuba sued the Excelsior Water and Mining Company, the Eureka Lake and Yuba Canal Company Consolidated, the Blue Tent Consolidated Hydraulic Gold Mines of California, Limited, and the Yuba River Gold Washing Company. Injunctions were issued in all these cases *ex parte* and without notice to the defendants.

Then came the suit of the county of Sutter *vs.* J. T. HICKEY *et al.*, commenced April 4th, 1882, in the county of Colusa. The defendants' mine is in Nevada County. Also, at about the same time, a suit was begun against the Birdseye Creek Company, of Placer County.

The last action brought is that of EDWARDS WOODRUFF *vs.* North Bloomfield Gravel Mining Company, Milton Mining and Water Company, and some eight other companies. It is substantially of the same nature as the others, praying for a perpetual injunction. WOODRUFF being a citizen of another State, the suit was brought in the Circuit Court of the United States, Judge SAWYER presiding. Defendants demurred on the ground of misjoinder of parties defendant. The demurrer was argued by the ablest counsel in the State, occupying the court two weeks. Judge SAWYER held that the demurrer was not tenable, and required defendant to answer on May 9th.

The decision of Judge TEMPLE, in June, 1881, indicated the solution which the miners must make up their minds to accept. They declare that they are ready and willing to build dams; but their opponents are not so willing to have this remedy applied. It is claimed that, sooner or later, such dams will give way, and let loose vast accumulations of *débris* to desolate the plains. In the present attitude of the courts, however, we presume that the construction of dams by the mining companies will be accepted, and injunctions will not be continued thereafter.

An effort has been made to get aid from the Federal government in the building of such dams. But it has failed—and, though we sympathize with the troubles of our hydraulic mining friends, we must frankly say that we do not think it a fair case for national expenditure. The best that could be said for it would be that it was less improper than many of the items in the River and Harbor bill. However, that need not be argued now. The miners generally expect to build their own dams. These dams will restrain the coarser material, but not the finest *slickens*.

The various companies operating on the Yuba are reported to be doing better than at any time in their history. That is, the ground is paying more per cubic yard and per inch of water. But the effect of the litigation has been disastrous in many ways. Capital has been driven from the State. Real estate has depreciated in the mining counties; and great works in contemplation have been suspended or abandoned. The alliance of Kearneyism and Grangerism, which has given vigor to various crusades against capital in California, is probably responsible for the loud complaint of "dull times" in the State. Nobody appears to be happy there except the Chinese, who, having been protected by law against the competition of their countrymen, naturally feel that they have the best of the bargain. Altogether, it is a pretty picture of the boomerang in politics.

GUNS AND ARMOR.

The comparative inactivity of our government in matters of coast and maritime defense for years past has had one compensation. Other nations have spent many millions in costly experiments, gradually perfecting both heavy guns and armor; and we now get the benefit of their discoveries. The armaments, afloat or ashore, with which we ended the war in 1865 are out of fashion long ago. Apart from our ingenious, but almost untried, stationary and moving torpedoes, there would be nothing to-day to prevent first-class iron-clads, such as are owned by more than one second or third-rate power, from getting near enough to bombard any of our great coast cities. It will not be safe to trust our luck forever. The defense of our harbors should be seriously prepared. And while it may be that the art of war will be yet farther advanced, there are signs that the limit of progress, on the lines hitherto pursued, has been nearly reached, both as to size of guns and as to thickness of floating armor.

The U. S. Board of Engineers for Fortifications has recently submitted (*Professional Papers of the Corps of Engineers, U. S. Army*, No. 25) a valuable report upon the practice in Europe with the heavy Armstrong, Woolwich, and Krupp rifled guns. The conclusions of this report are as follows:

"Experimental firings for penetration during the past twenty years have determined:

"1st. That wrought-iron and cast-iron, unless chilled, are unsuitable for projectiles to be used against iron armor; that the best material for that purpose is hammered steel or Whitworth's compressed steel.

"2d. That cast-iron and cast-steel armor-plates will break up under the impact of the heaviest projectiles now in service unless made so thick as to exclude their use in ship protection.

"3d. That wrought-iron plates have been so perfected that they do not break up, but are penetrated by displacement or crowding aside of the material in the path of the shot, the rate of penetration bearing an approximately determined ratio to the striking energy of the projectile, measured per inch of shot's circumference, as expressed by the following formula:

$$\text{Penetration} = 2{\cdot}035 \sqrt{\frac{V^2 P}{2g \times 2r\pi \times 2240 \times 0{\cdot}86}} \text{ in inches.}$$

V = velocity in feet per second; P = weight of shot in pounds; r = radius of shot in inches.

"That such plates can, therefore, be safely used in ship construction, their thickness being determined by the limit of flotation and the protection needed.

"4th. That though experiments with wrought-iron plates faced with steel have not been sufficiently extended to determine the best combination of these two materials, we may nevertheless assume that they give a resistance about one fourth greater than those of homogeneous iron.

"5th. That hammered steel in the late Spezzia trials proved superior to any other material hitherto tested for armor-plates. The 19-inch plate resisted penetration and was only partially broken up by four shots, three of which had a striking energy of between 33,000 and 34,000 foot-tons each. Not one shot penetrated the plate. Those of chilled iron were broken up, and the steel projectile, though of excellent quality, was set up to about two thirds of its length. This experiment seems to promise the solution of the problem to determine a material for armor-plates which, though limited in thickness to the carrying capacity of the ship to be protected, will still have sufficient resistance to break up the projectiles of the largest guns now in the naval service, without being penetrated or broken by the projectile.

"It seems probable that a hammered-steel plate, like that tried at Spezzia, if equal in thickness to the belt armor of the Inflexible (22 inches), would stop the shot of the 100-ton gun (Armstrong), fired with its greatest practicable velocity.

"Finally, these later experiments confirm this Board in its opinion, enunciated some years since, that, while the 12-inch rifled gun may prove a sufficient armament for the barbette batteries of our sea-coast defenses, as against the lighter iron-clads of foreign navies, iron turrets, armed with guns of 100 tons weight at least, will be needed to meet the attack of armored ships of the latest construction."

The 100-ton chambered Armstrong gun, throwing a projectile of a ton weight, and fired with a charge of over 700 pounds of powder, may be taken as a sample of the monstrous requirements of modern war. Such guns must be both made and operated by machinery. A larger steam-hammer

than any now in this country is required to make them. These are pre-eminently the things which can not be improvised in a sudden emergency, and which should therefore be prudently prepared in time of peace. We are strong in the particulars in which we are least exposed to danger. The patriotism and valor of our citizens may be relied upon to repel invasion—but nobody is likely to invade us; and all our martial ardor would not prevent a single modern armored ship from levying a forced contribution upon the city of New York, in defiance of the puny cannon of the last generation which grin harmlessly from the forts of the harbor. *

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

The Metal Exchange Reorganization.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In reply to an article in yesterday's *Iron Age* on "The Metal Exchange Reorganization," I would like to record my hearty concurrence in one sentiment expressed therein—that there has been "too much of calling names and making faces," and am only sorry that the editor has lost his temper in a professional and, I trust, Pickwickian sort of way, instead of quietly taking for his paper a fair share of punishment in a discussion he himself provoked. Yours truly,

NEW YORK, April 27. EDWARD J. SHRIVER.

ANALYSIS OF THE FRANKLINITE ORES OF NEW JERSEY.*

By Dr. Pierre De P. Ricketts.

Some time since, my attention was called to the question of determining a method for estimating the amount of red oxide of zinc contained in certain deposits of these Franklinite ores. Some of the results obtained have not been published, other than in the testimony taken in lawsuits about these deposits.

The methods employed were briefly as follows: The first was a mechanical separation, made by Mr. A. F. Wendt and myself, for the purpose of obtaining the mineral constituents of the samples treated, as nearly as possible. The ore was crushed down to below 40 meshes to the inch, and sieved. The Franklinite was then extracted by the magnet from an average portion of the sample, and the red oxide separated by hand, under a powerful magnifying-glass, from the residue, by using a fine wire with a small hook at the end. The result of the separation of the 1700-ton sample was:

	A.	B.
Franklinite	48·2 per cent.	44·7 per cent.
Red oxide	2·7 "	7·4 "
Silicates and carbonates	49·1 "	47·9 "
	100·0	100·0

The next method adopted was to take average samples of the Franklinite ore, carefully separate from a portion of the sample the mineral constituents contained in the same, and analyze the separated minerals. Several analyses of average samples were then made, and from these, and the analysis of the separated minerals, the mineralogical constitution of the ores was calculated.

The complete analyses of the average samples were as follows:

	A.	B.	C.	D.
Silica	11·85	11·59	8·64	10·70
Oxide of zinc	34·13	40·83	34·70	33·09
Proto-sesqui-oxide of iron	28·48	29·94	28·34	31·05
Alumina	0·58	trace.	trace.	trace.
Protoxide of manganese	14·13	8·35	15·50	15·51
Lime	5·51	4·16	5·70	4·59
Magnesia	0·13	0·79	1·44	0·27
Carbonic acid	4·96	4·12	6·26	4·38
Copper	0·07	undetermined.	trace.	trace.
	99·84	99·78	100·58	99·59

The analysis of the constituent minerals gave the following figures, as representative of their constitution, after separating and cleaning them from adhering gangue, etc., under a magnifying-glass:

	A. Franklinite.	B. Zincite.	C. Willemite residue.
Silica and insoluble matter	2·62	0·81	24·36
Oxide of zinc	21·60	95·23	48·06
Proto-sequi-oxide of iron	55·80	trace.	1·97
Alumina	trace.	trace.	.....
Protoxide of magnesia	17·06	3·51	12·25
Lime	1·28	0·32	6·29
Magnesia	0·30	0·10	0·99
Carbonic acid	1·35	0·37	6·28
Copper	none.	undetermined.	trace.
	100·04	100·34	100·20

The Franklinite, after deducting foreign constituents, such as silica, magnesia, lime, etc., would have the following composition: Oxide of zinc, 22·90; protoxide of manganese, 18·08; and proto-sesqui-oxide of iron, 59·15. The zincite, allowing for the impurities which even careful picking could not separate, would have the following constitution: Oxide of zinc, 96·44; protoxide of manganese, 3·55; proto-sesqui-oxide of iron, a trace. The Willemite analyzed evidently contained considerable limestone and impurities, and although the analysis is stated, it was thought safer to take the composition of Willemite as given by Dana, in calculating the mineralogical constituents of the ore. Taking the analysis of sample marked "A," considering the constitution of the Franklinite and zinc as determined, and using the mechanical separation marked "A," we should have the following as the mineralogical composition of the sample:

Zincite.	Franklinite.	Willemite (Dana).
ZnO 96·44	22·90	72·90 per cent.
MnO 3·55	18·08	SiO_2 27·10 " "
Fe_2O_4	59·15	

Mechanical separation of 1700-ton sample gave: Franklinite 48·2; Zincite 2·7; Silicates and carbonates 49·1

By computing the quantity of oxide of zinc in the Franklinite and zincite, 20·49 per cent of oxide of zinc remain in sample "A" for Willemite, which, requiring 7·617 per cent of silica, would correspond to 28·107 of Willemite.

Deducting the silica for the Willemite from the total silica, and the amount for the alumina present, a balance of 3·893 of silica remains, which would require 4·589 per cent of protoxide of manganese, equal to 8·482 of rhodonite. By analyses, the carbonates of lime and magnesia were 10·110 per cent, leaving a difference of 1·481, of which 1·270 per cent would be carbonate of manganese, calculated from the excess of carbonic acid, leaving 0·211 for copper, etc.

The following is a statement of the mineralogical composition of the ore, as calculated from the analysis:

	SiO_2.	ZnO.	Fe_2O_4.	MnO.	Al_2O_3.	CO_2.	CaO and MgO.	Calculated.
Franklinite	.....	11·04	28·51	8·710	.....	.....	.....	48·200
Willemite	7·617	20·49	.....	.....	.....	.....	.....	28·107
Silicate of alumina, etc.	0·340	.....	.....	.....	0·58	.....	.....	0·920
Red oxide	.....	2·60	.....	0·100	.....	.....	.....	2·700
Rhodonite	3·893	.....	.....	4·589	.....	.....	.....	8·482
Carbonate of manganese	.....	.....	.....	0·780	.....	0·49	.....	1·270
Limestone	.....	.....	.....	.....	.....	4·47	5·64	10·110
Copper, etc	.....	.....	.....	.....	.....	.....	.....	0·211
Totals	11·850	34·13	28·51	14·179	0·58	4·96	5·64	100·000
Found by analysis	11·850	34·13	28·48	14·130	0·58	4·96	5·64	99·770

To check this calculation, the average composition of Franklinite, Willemite, and zincite, as given by Dana, were used in connection with the mechanical separation already referred to, and the calculation made as to the composition of Sample "A," with the results given below:

Zincite.	Franklinite.	Willemite.
ZnO 95·20	ZnO 20·72	ZnO 69·97
MnO 3·19	MnO 12·72	MnO 1·14
	Fe_2O_4 63·96	Fe_2O_4 trace
		SiO_2 16·81

Franklinite	48·2	
Zincite	2·7	
Willemite	38·84	= 38·64 silicates.
Rhodonite	7·80	
Limestone	10·11	= 11·38 carbonates.
Carb. manganese	1·27	
	100·92	50·02 per cent silicates and carbonates.

Other methods of calculation were employed, such as applying the various standard analyses of Franklinite to the complete analysis given, considering that all the iron found came from the Franklinite, and using that as a starting-point. For instance, taking an analysis of Franklinite as given by Cook, and applying it to complete analysis marked "D," we should obtain the following calculation and results:

The analysis of Franklinite gives sesqui-oxide of iron, 62·36—equivalent to proto-sesqui-oxide, 60·28; oxide of zinc, 22·95; protoxide of manganese, 17·20. Taking the proto-sesqui-oxide of iron in the sample at 31·05, and comparing with the proto-sesqui-oxide of iron in 100 parts as found in the Franklinite, the amount of Franklinite corresponding to 31·05 is easily obtained. Calculating the silicate of manganese as rhodonite, taking all the oxide of zinc necessary for silica, etc., and calling what remains red oxide, we should have the approximate mineralogical composition of Sample "D":

Franklinite	51·51
Red oxide of zinc	6·40
Rhodonite	11·13
Willemite	20·23
Carbonate of manganese	1·24
Limestone	8·76
	99·27

The next trial made was to determine some solvent which would dissolve the red oxide of zinc, and practically leave the other mineral constituents, with the exception of the limestone, unacted on.

THE Massachusetts Institute of Technology, of Boston, which begins its next school year on September 24th, has set aside the following dates for entrance examinations: May 31st, June 1st, and September 18th and 19th.

* Abstract of a paper read before the New York Academy of Sciences.

NEW PUBLICATIONS.

MANUAL OF ASSAYING GOLD, SILVER, COPPER, AND LEAD ORES. By WALTER LEE BROWN, B.Sc. With Illustrations. Chicago: Jansen, McClurg & Co. 1883. 12mo, 318 pages. (*Index.*) Price, $1.75.

Mr. Walter Lee Brown, who has had much experience as a chemist and assayer, has endeavored, we may add with marked success, to prepare a work on assaying which will aid those who have had no previous scientific or technical training. Those who have had occasion to train youths fresh from school, to make them competent assistants, have, we believe, generally felt that the standard works of Mitchell, Ricketts, and Kerl are, on the whole, not available as guides to this class of beginners, however high they stand as text-books for those who have gone through a course of chemistry and assaying. Mr. Brown probably will agree with us that in many cases it may be deplored that our assayers, or those who would enter that branch of the profession, have not obtained that preliminary training. Still, the fact remains that there is a large class of such men; and in filling the large demand for a work suitable as a guide to them, Mr. Brown has done them a service, and has, at the same time, we believe, lightened the labor of those who are forced by circumstances to train assistants.

Mr. Brown's work is, of course, essentially elementary. He devotes a long chapter to a description of the apparatus used in assaying, to the reagents, and to testing them. His second part, treating of the assays of gold, silver, copper, and lead ores, is full and, we believe, within the grasp of any beginner. We note some little points where perhaps he is not quite elementary enough. Thus, for instance, in speaking of preliminary roasting of silver ores in the scorification assay, he says, "Whenever an ore contains a large amount of antimony, arsenic, sulphur, or zinc, it can first be roasted," without, however, giving his reader any idea how to detect such obnoxious elements. In the description of the crucible assay, we note a neat hint by Mr. A. H. Low, of Argo, Colo., when working sulphuret ores. Mr. Brown treats the dry copper assays rather too briefly; but in an appendix gives a good description of the Luckow electrolytic assay, which, after all, with proper precautions, is destined to become the standard method. The chapter on lead ores is good.

In the appendix, Mr. Brown has gathered a number of papers, among them the late Mr. F. A. Lowe's article on metallic scales, a paper by Mr. M. G. Nixon, M.E., on the laboratory mill run, the pan test for gold, the chlorination assay for gold, the assay of gold bullion, base bullion, determination of moisture, etc.

EXTRACTS FROM CHORDAL'S LETTERS. *New and Enlarged Edition, with Additional Plates.* [By JAMES W. SEE, Hamilton, O.] New York: John Wiley & Sons. 1883. 12mo, 396 pages. (*No Index.*)

A new edition of the inimitable letters which "Chordal," Mr. James W. See, has contributed to our vigorous young contemporary, the *American Machinist*, has been issued. We have already dwelt upon the characteristics which have made this work as well one of the most entertaining as one of the most useful works in the library of an engineer or mechanic. Mr. See has watched men and methods with the eyes of a keen observer, and in a humorous garb he has clad a sharp and discriminating criticism of much that needs reform. A man of clear common sense, he has the knack of hitting upon a point of view that is original, and throws a flood of suggestive light on the subject of which he is treating.

CONVERSION TABLES OF METRIC AND BRITISH OR UNITED STATES WEIGHTS AND MEASURES. By ROBERT H. THURSTON. New York: John Wiley & Sons. 8vo, 83 pages.

The title of this little book sufficiently indicates its aims and its scope. It is, so far as we are able to judge, in substance a reprint of an appendix to Professor Thurston's recent work on the Materials of Engineering. The figures are plainly printed, and the arrangement suitable to the purpose.

THE REMOVAL OF AMMONIA FROM CRUDE GAS.

In connection with the many plans now brought forward to utilize the ammonia in the gases escaping from coke-ovens and blast-furnaces, it may be of interest to refer to a process brought out some years ago in connection with illuminating gas manufacture by Messrs. Bolton & Wanklyn, and adapted by them, we understand, to the metallurgical branches also. When bone-ash or any other substance containing phosphate of lime is treated with sulphuric acid, the products formed are superphosphate of lime and hydrated sulphate of lime, this mixture is known as superphosphate of lime in commerce, and is the substance used in this process. This substance is capable of absorbing carbonic acid and ammonia from foul gas. The complete action can only take place in the presence of a certain proportion of carbonic acid, so that the process is not so successful with "well-scrubbed illuminating gas." The superphosphate is converted into carbonate of lime, while the ammonia combines with the phosphoric acid to form phosphate of ammonia; the hydrated sulphate of lime is also acted upon, and forms carbonate of lime and sulphate of ammonia; so that, presuming the action to be complete, and the material to be thoroughly saturated with carbonic acid and ammonia from the foul gas, the result is a mixture of carbonate of lime and phosphate and sulphate of ammonia. Under these circumstances, the mixture absorbs one equivalent of carbonic acid for every four equivalents of ammonia; therefore, if the superphosphate process be substituted for the ordinary washers and scrubbers, a large proportion of the carbonic acid and also the whole of the sulphureted hydrogen is left in the gas, and must be dealt with in other ways. This superphosphate process has been at work at the South Metropolitan Gas-Works, Old Kent Road, for nearly two years. In practice it is usual to water the superphosphate before use with ammoniacal liquor, and it is used in dry purifiers, in layers about eight inches thick. This process has been thoroughly investigated at the Munich Gas-Works, by Drs. Bünte and Schilling, and the report made by these gentlemen proves its practical efficiency, and therefore the question of its advantage, as compared with washing and scrubbing, is based chiefly upon financial considerations. It is evident that in foreign parts, or in any place where there is a difficulty in disposing of the ammonia, the obtaining of the same in a dry form offers several advantages as compared with having it as a weak solution.

THE EARLY HISTORY OF THE STEAM-HAMMER.

An autobiography of James Nasmyth, the great British engineer, has just been published, in which he gives the following account of the manner in which he was led to invent the steam-hammer, with which his name will always be associated, and how it was introduced into practice:

"My connection with the Great Western Railroad Company shortly led to a most important event in connection with my own personal history. It appears that the Great Western steamship had been very successful in her voyages between Bristol and New York; so much so, indeed, that the directors of the company ordered the construction of another vessel of much greater magnitude—the Great Britain. Mr. Francis Humphries, their engineer, came to Patricroft to consult with me as to the machine tools, of unusual size and power, which were required for the construction of the immense engines of the proposed ship, which were to be made on the vertical trunk principle. Very complete works were erected at Bristol for the accommodation of the requisite machinery. The tools were made according to Mr. Humphries's order; they were delivered and fitted to his entire approval, and the construction of the gigantic engines was soon in full progress.

"An unexpected difficulty, however, was encountered with respect to the enormous wrought-iron intermediate paddle-shaft. It was required to be of a size and diameter the like of which had never been forged. Mr. Humphries applied to the largest firms throughout the country for tenders of the price at which they would execute this important part of the work; but to his surprise and dismay, he found that not one of them would undertake so large a forging. In this dilemma, he wrote a letter to me, which I received on November 24th, 1839, informing me of the unlooked-for difficulty. 'I find,' he said, 'that there is not a forge-hammer in England or Scotland powerful enough to forge the intermediate paddle-shaft of the engines for the Great Britain! What am I to do? Do you think I might dare to use cast-iron?'

"This letter immediately set me a-thinking. How was it that the existing hammers were incapable of forging a wrought-iron shaft of thirty inches diameter? Simply because of their want of compass, of range and fall, as well as of their want of power of blow. A few moments' rapid thought satisfied me that it was by our rigidly adhering to the old, traditional form of a smith's hand-hammer—of which the forge and tilt-hammer, although driven by water or steam power, were mere enlarged modifications—that the difficulty had arisen; as, whenever the largest forge-hammer was tilted up to its full hight, its range was so small that, when a piece of work of considerable size was placed on the anvil, the hammer became 'gagged;' so that when the forging required the most powerful blow, it received next to no blow at all, as the clear space for the fall of the hammer was almost entirely occupied by the work on the anvil.

"The obvious remedy was to contrive some method by which a ponderous block of iron should be lifted to a sufficient hight above the object on which it was desired to strike a blow, and then to let the block fall down upon the forging, guiding it in its descent by such simple means as should give the required precision in the percussive action of the falling mass. Following out this idea, I got out my 'scheme-book,' on the pages of which I generally *thought out*, with the aid of pen and pencil, such mechanical adaptations as I had conceived in my mind, and was thereby enabled to render them visible. I then rapidly sketched out my steam-hammer, having it all clearly before me in my mind's eye. In little more than half an hour after receiving Mr. Humphries's letter, narrating his unlooked-for difficulty, I had the whole contrivance, in all its executant details, before me in a page of my scheme-book. The date of this first drawing was November 24th, 1839.

"My steam-hammer, as thus first sketched, consisted of, first, a massive anvil, on which to rest the work; second, a block of iron, constituting the hammer or blow-giving portion; and third, an inverted steam-cylinder, to whose piston-rod the hammer-block was attached. All that was then required to produce a most effective hammer was simply to admit steam of sufficient pressure into the cylinder, so as to act on the under side of the piston, and thus to raise the hammer-block attached to the end of the piston-rod. By a very simple arrangement of a slide-valve, under the control of an attendant, the steam was allowed to escape, and thus permit the massive block of iron rapidly to descend by its own gravity upon the work then upon the anvil.

"Thus, by the more or less rapid manner in which the attendant allowed the steam to enter or escape from the cylinder, any required number or any intensity of blows could be delivered. Their succession might be modified in an instant; the hammer might be arrested and suspended according to the requirements of the work. The workman might thus, as it were, *think in blows*. He might deal them out on to the ponderous glowing mass, and mold or knead it into the desired form as if it were a lump of clay; or pat it with gentle taps, according to his will, or at the desire of the forge-man.

"Rude and rapidly sketched out as it was, this, my first delineation of the steam-hammer, will be found to comprise all the essential elements of the invention. Every detail of the drawing retains to this day the form and arrangement which I gave to it forty-three years ago. I believed that the steam-hammer would prove practically successful; and I looked forward to its general employment in the forging of heavy masses of iron. It is no small gratification to me now, when I look over my rude and hasty first sketch, to find that I hit the mark so exactly, not only in general structure but in the details; and that the invention, as I then conceived it and put it into shape, still retains its form and arrangements intact in the thousands of steam-hammers that are now doing good service in the mechanical arts throughout the civilized world.

"But to return to my correspondence with the Great Western Company. I wrote at once to Mr. Humphries, and sent him a sketch of my proposed steam-hammer. I told him that I felt assured he would now be able to overcome his difficulty, and that the paddle-shaft of the Great Britain might now be forged. Mr. Humphries was delighted with my design. He submitted it to Mr. Brunel, engineer-in-chief of the steamship; to Mr. Guppy, the managing director; and to other persons interested in the undertaking—by all of whom it was heartily approved. I accordingly gave the company permission to communicate my design to such forge proprietors as might feel disposed to erect the steam-hammer, the only condition that I made being that, in the event of its being adopted, I was to be allowed to supply it in accordance with my design.

"But the paddle-shaft of the Great Britain was never forged. About that time, the substitution of the screw for the paddle-wheel as a means of propulsion was attracting much attention. The performances of the Archimedes, contrived by Mr. Francis P. Smith, were so satisfactory that Mr. Brunel, after he had made an excursion in that vessel, recommended the directors to adopt the new propelling power. After much discussion, they yielded to his strongly-urged advice. The consequence was, that the great engines which Mr. Humphries had so elaborately designed, and which were far advanced in construction, were given up, to his inexpressible regret and mortification, as he had pinned his highest hopes as a practical engineer on the results of their performance; and, to crown his distress, he was ordered to produce fresh designs of engines specially suited for screw propulsion. Mr. Humphries was a man of the most sensitive and sanguine constitution of mind. The labor and the anxiety which he had already undergone, and perhaps the disappointment of his hopes, proved too much for him, and a brain-fever carried him off after a few days' illness. There was thus, for a time, an end of the steam-hammer required for forging the paddle-shaft of the Great Britain.

"Very bad times for the iron trade and for all mechanical undertakings set in about this time. A wide-spread depression affected all conditions of industry. Although I wrote to the heads of all the great firms, urging the importance of my invention, and forwarding designs of my steam-hammer, I was unable to obtain a single order. It is true they cordially approved of my plan, and were greatly struck by its simplicity, unity, and apparent power; but the substance of their replies was, that they had not sufficient orders to keep the forge-hammers they already possessed in work. They promised, however, that, in the event of trade recovering from its depression, they would probably adopt the new power.

"In the mean time, my invention was taken up in an entirely new and unexpected quarter. I had for some years been supplying foreign customers with self-acting machine tools. The principals of continental manufacturing establishments were accustomed to make frequent visits to England, for the purpose of purchasing various machine tools required for the production of the ponderous as well as the lighter parts of their machinery. We gave our foreign visitors every facility and opportunity for seeing our own tools at work; and they were often so much pleased that, when they came to order one special tool, they ended by ordering many—the machine tools in full activity, thus acting as their most effective advertisements.

"In like manner I freely opened my scheme-book to any foreign visitors. There I let them see the mechanical thoughts that were passing through my mind, reduced to pen-and-ink drawings. I did not hesitate to advocate the advantage of my steam-hammer over every other method of forging heavy masses of iron; and I pointed out the drawing in my scheme-book in confirmation of my views. The book was kept in the office, to be handy for such occasions; and in many cases it was the means of suggesting ideas of machine tools to our customers, and thus led to orders which might not have been obtained without this effective method of prompting them. Among our foreign visitors was M. Schneider, proprietor of the great iron-works at Creusot, in France. We had supplied him with various machine tools; and he was so pleased with their action that, the next time he came to England, he called at our office at Patricroft. M. Bourdon, his mechanical manager, accompanied him.

"I happened to be absent on a journey at the time; but my partner, Mr. Gaskell, was present. After showing them over the works, as an act of courtesy he brought them my scheme-book and allowed them to examine it. He pointed out the drawing of my steam-hammer, and told the purpose for which it was intended. They were impressed with its simplicity and apparent practical utility—so much so that M. Bourdon took careful notes and sketches of the constructive details of the hammer.

"I was informed, on my return, of the visit of MM. Schneider and Bourdon; but the circumstance of their having inspected the designs in my scheme-book, and especially my original design of the steam-hammer, was regarded by my partner as too ordinary and trivial an incident of their visit to be mentioned to me. The exhibition of my mechanical designs to visitors at the foundry was a matter of almost daily occurrence. I was, therefore, in entire ignorance of the fact that these foreign visitors had taken with them to France a copy of the plan and details of my steam-hammer.

"It was not until my visit to France in April, 1842, that the upshot of their visit was brought under my notice in an extraordinary manner. I was requested by M. Bouchier, Minister of Marine, to visit the French dock-yards and arsenals, for the purpose of conferring with the director of each with reference to the supply of various machine tools for the proper equipment of the marine engine factories in connection with the royal dock-yards. In order to render this journey more effective and instructive, I visited most of the French engineering establishments which had been supplied with machine tools by our firm. Among these was, of course, the famous firm of Schneider, whose works at Creusot lay not far out of the way of my return journey. I accordingly made my way thither, and found M. Bourdon at his post, although M. Schneider was absent.

"M. Bourdon received me with much cordiality. As he spoke English with fluency, I was fortunate in finding him present, in order to show me over the works; on entering which, one of the things that particularly struck me was the excellence of a large wrought-iron marine engine single crank, forged with a remarkable degree of exactness in its general form. I observed also that the large eye of the crank had been punched and drifted with extraordinary smoothness and truth. I inquired of M. Bourdon 'how that crank had been forged.' His immediate reply was, '*It was forged by your steam-hammer!*'

"Great was my surprise and pleasure at hearing this statement. I asked him how he had come to be acquainted with my steam-hammer. He then narrated the circumstance of his visit to the Bridgewater Foundry during my absence. He told me of my partner having exhibited to him the original design, and how much he was struck by its simplicity and probable efficiency; that he had taken careful notes and sketches on the spot; that among the first things he did after his return to Creusot was to put in hand the necessary work for the erection of a steam-hammer; and that the results had in all respects realized the high expectations he had formed of it.

"M. Bourdon conducted me to the forge department of the works, that I might, as he said, '*see my own child;*' and there it was, in truth—a thumping child of my brain! Until then it had only existed in my scheme-book; and yet it had often and often been before my mind's eye in full action. On inspecting the steam-hammer, I found that Bourdon had omitted some important details, which had led to a few mishaps, especially with respect to the frequent breaking of the piston-rod at its junction with the hammer-block. He had effected this, in the usual way, by means of a cutter-wedge through the rod; but he told me that it often broke, through the severe jar during the action of the hammer. I sketched for him, then and there, in full size, on a board, the elastic packing under the end of the piston-rod, which acted, as I told him, like the cartilage between the bones of the vertebræ, preventing the destructive effects of violent jars. I also communicated to him a few other important details, which he had missed in his hasty inspection of my design. Indeed, I felt great pleasure in doing so, as I found Bourdon to be a most intelligent mechanic, and thoroughly able to appreciate the practical value of the information I communicated to him. He expressed his obligation to me in the warmest terms, and the alterations which he shortly afterward effected in the steam-hammer, in accordance with my plans, enabled it to accomplish every thing that he could desire.

"I had not yet taken out a patent for the steam-hammer. The reason was this: The cost of the patent, at the time I invented it, was little short of £500, all expenses included. My partner was unwilling to lay out so large a sum upon an invention for which there seemed to be so little demand at that time, and I myself had the whole of my capital embarked in the concern. Besides, the general depression still continued in the iron trade, and we had use for every farthing of money we possessed. I had been warned of the risk I ran by freely exhibiting my original design, as well as by sending drawings of it to those who I thought were most likely to bring the invention into use. But nothing had as yet been done in England. It was left for France, as I have described. to embody my invention in an actual steam-hammer.

"I now became alarmed, and feared lest I should lose the benefits of my invention. As my partner declined to help me, I applied to my brother-in-law, William Bennett. He was a practical engineer, and had expressed himself as highly satisfied with its value. He had also many times cautioned me against 'publishing' its advantages so widely, without having first protected it by a patent. He was, therefore, quite ready to come to my assistance. He helped me with the necessary money, and the invention was placed in a position of safety so far as my interests were concerned. In return for his kindness, I stipulated that the reimbursement of his loan should be a first charge upon any profits arising from the manufacture of the steam-hammer, and also that he should have a share in the profits during the period of the patent rights. Mr. Bennett lived for many years, rejoicing in the results of his kindness to me in the time of my difficulty. I may add that the patent was secured in June, 1842, or less than two months after my return from France.

"Soon after this, the iron trade recovered from its depression. The tide of financial prosperity of the Bridgewater Foundry soon set in, and my partner's sanguine confidence in my ability to raise it to the condition of a thriving and prosperous concern was justified in a most substantial manner. In order to make the most effective demonstration of the powers and capabilities of my steam-hammer, I constructed one of 30 cwt. of hammer-block, with a clear four-foot range of fall. I soon had it set to work, and its energetic services helped us greatly in our smith and forge work. It was admired by all observers. People came from a distance to see it. Mechanics and iron-founders wondered at the new power which had been born. The precision and beauty of its action seemed marvelous. The attendant could, by means of the steam slide-valve level in his hand, transmit his will to the action of the hammer, and thus *think* in blows. The machine combined great power with gentleness. The hammer could be made to give so gentle a blow as to crack the end of an egg placed in a wine-glass on the anvil, while the next blow would shake the parish, or be instantly arrested in its descent midway.

"Hand-gear was the original system introduced in working the hammer. A method of self-acting was afterward added. In 1843, I admitted steam above the piston, to aid gravitation. This was an important improvement. The self-acting arrangement was eventually done away with, and hand-gear again became all but universal. Sir John Anderson, in his admirable 'Report on the Vienna Exhibition of 1873,' says: 'The most remarkable features of the Nasmyth hammers were the almost entire abandonment of the old self-acting motion of the early hammers, and the substitution of new devices, and in the use of hand-gear only in all attempts to show off the working. There is no real saving, as a general rule, by the self-acting arrangement, because one attendant is required in either case; and, on the other hand, there is frequently a positive loss in the effect of the blow. By hand-working, with steam on top of piston, the full force can be more readily maintained until the blow is fully delivered. It is thus more of a 'dead blow' than was formerly the case with the other system.'

"There was no want of orders when the valuable qualities of the steam-hammer came to be seen and experienced. The first order came from Rushton & Eccersley, of Bolton, who, by the way, had seen the first copy of my original design a few years before. The steam-hammer I made for them was more powerful than my own. The hammer-block was of five tons weight, and had a clear fall of five feet. It gave every satisfaction, and the fame of its performances went abroad among the iron-workers. The Low Moor Iron-Works Company followed suit with an order for one of the same size and power; and another came from Hawkes & Co., of Newcastle-upon-Tyne.

"One of the most important uses of the steam-hammer was in forging anchors. Under the old system, anchors—upon the soundness of which the safety of ships so often depends—were forged upon the 'bit by bit' system. The various pieces of an anchor were welded together, but at the parts where the different pieces of iron were welded together flaws often occurred; the parts would break off—blades from the stock, or flukes from the blades—and leave the vessel, which relied upon the security of its anchor, to the risk of the winds and waves. By means of the steam-hammer, these risks were averted. The slag was driven out during the hammering process. The anchor was sound throughout, because it was welded as a whole.

"Those who are technically acquainted with smith-work as it used to be

practiced, by what I term the 'bit by bit' system, that is, of building up from many separate parts of iron, afterward welded together into the required form, can appreciate the vast practical value of the 'die' method brought into general use by the controllable but immense power of the steam-hammer. At a very early period of my employment of the steam-hammer, I introduced the system of stamping masses of welded hot iron as if it had been clay, and forcing it into suitable molds or dies placed upon the anvil. This practice had been in use on a small scale in the Birmingham gun-trade. The iron-work of fire-arms was thus stamped into exact form. But until we possessed the wide range and perfectly controllable powers of the steam-hammer, the stamping system was confined to comparatively small portions of forge work. The new power enabled the die and stamp system to be applied to the largest class of forge work; and another era in the working of ponderous masses of smith and forge work commenced, and has rapidly extended until the present time. Without entering into further details, the steam-hammer has advanced the mechanical arts, especially with relation to machinery of the larger class, to an extent that is of incalculable importance.

"Soon after my steam-hammer had exhibited its merits as a powerful and docile agent in percussive force, and shown its applicability to some of the most important branches of iron manufacture, I had the opportunity of securing a patent for it in the United States. This was through the kind agency of my excellent friend and solicitor, the late George Humphreys, of Manchester. Mr. Humphreys was a native of Philadelphia, and the intimate friend of Samuel Vaughan Merrick, founder of the eminent engineering firm of that city. Through his instrumentality, I forwarded to Mr. Merrick all the requisite documents to enable a patent to be secured at the United States Patent-Office, at Washington. I transferred the patent to Mr. Merrick, in order that it might be worked to our mutual advantage. My invention was thus introduced into America under the most favorable auspices. The steam-hammer soon found its way into the principal iron-works of the country. The admirable, straightforward manner in which our American agent conducted the business from first to last will ever command my grateful remembrance."

THE SILVER KING MINE.

By William P. Blake.

History of the Discovery and Location.—The importance of the Silver King mine in the history of mining in the United States, and particularly in the territory of Arizona, lends more than the usual interest to the details of the discovery and location to the vein. The efforts to find the locality and to open up the mine date back into the period when the southwestern and central parts of Arizona were still in possession of the savages, and the history of the mine is closely connected with the development of the region and its settlement by the white man. In fact, the Silver King has been an important if not the leading factor in the reclamation of the Pinal region from the murderous Apaches. These hereditary, marauding savages dominated the whole region, and made it almost inaccessible to the hardy and daring prospectors who began to press outward from the frontier settlements on the Gila River toward its sources in the mountains.

The Pinal Mountains, rising to the eastward of the broad plains of the Gila and Salt rivers, stretch northwestward from the Gila to the higher ranges of the White Mountains, and to the plains of the Great Colorado. This range has many spurs and irregular outlying masses cut by cañons leading down to the Gila Valley, which, by reason of their extreme ruggedness and impassable nature, afforded an excellent refuge and secure hiding-place for the Apaches after marauding expeditions to the plains or the destruction of helpless trains of immigrants. One of the trails most traveled by the Apaches led up the valley of the little creek now known as Queen Creek, and over the nearly vertical face of the mountain, within a stone's throw, almost, of the point where the Silver King mine was afterward discovered. That the vicinity was the favorite resort and hiding-place of the savages is shown, also, by the fact that there are caves in the face of the cliffs overlooking the trail, containing piles of ashes and fragments of Indian pottery.

In the year 1873 (?), when General Stoneman, the accomplished cavalry officer, now Governor of California, was commander of the military department of Arizona, it became necessary to adopt more vigorous measures than had been made for the repression of Apache raids. To this end, General Stoneman moved with his command to the base of the mountains, near to the Apache trail, and established a camp. He then constructed a road or mule-trail diagonally up the face of the mountains leading over into the higher table-lands and valleys of the Pinal Range. This pack-trail, since known as "Stoneman's Grade," is the main traveled route to the mining districts of Globe and Pioneer.

One of the soldiers, named Sullivan, employed in cutting the trail, when returning from his work one evening, sat down to rest on a projecting rock, near the camp, and began picking up loose fragments of rock about him, among which there were some small but heavy, black, metallic-looking lumps. These, instead of breaking up when pounded on the stones, became flattened out, and were evidently metallic, somewhat resembling lead. This attracted his attention, but he did not fully realize the importance of his find. He, however, gathered a few of the lumps and went on to camp without saying any thing about his discovery to his comrades. His term of service expiring soon afterward, he was discharged from the service and made his way to the rancho of Charles G. Mason, on Salt River, near to the place where the town of Phœnix was afterward located. Mr. Mason was one of the very few frontiersmen who braved the terrors of the Apaches and staked out a farm on the fertile bottom-lands of the river. Sullivan remained at the place some time, and frequently showed the black ore (since familiarly known among the miners and prospectors of the region as "nugget silver") to Mr. Mason, but without telling exactly where he had found it. Mr. Mason supposed that he would go back to the place, and he no doubt expected to go with him and participate in the benefits of the discovery; but one day Sullivan suddenly disappeared, and was not heard of for years after. He was supposed to have been killed by the Apaches, or to have perished on the desert, in the attempt, perhaps, to return to the place where he had found the rich silver ore.

The desire to find the place where Sullivan had discovered the "pure stuff," as the rancheros called the black nuggets of silver sulphide, led them to make several attempts to get there. Prospecting parties were formed at intervals for several years to prospect the Pinal Mountains, and these parties were often close upon the spot without knowing it. They even made a location only a mile and a half distant from the place, and called it the Silver Queen. This was the first location made in the region; but no district was then defined by boundaries or organized by the appointment of a recorder. Later, the party extended their searches over the Pinal Mountains into the region now known as Globe District. They made a location there known to this time as the Globe mine, and they gave the name to the district. The next year, 1875, Mr. Mason and one of his neighbors, Benjamin W. Regan, formed a party of five, consisting of themselves, William H. Long, Isaac Copeland, and one man whose name can not now be recalled, to go again to the Globe mine, taking a train of animals to fetch out some of the ore. On their way back, March 21st, 1875, they were attacked by Apaches, and one of their party was killed. His body was taken to Camp Supply, at the summit of the Stoneman Grade, and was buried by his comrades in one of the old stone baking-ovens used for baking bread by Stoneman's soldiers. When the survivors reached the foot of the grade, near to the water and camp-ground, Copeland was sent to break off some of the croppings from projecting rocks at one side of the trail, and fetch them into camp two miles below. He went to the place indicated, and soon after came hurrying into camp shouting, "I have struck it," and "it is good enough for me." The excited and hopeful prospectors gathered around him, and as the pieces of croppings holding the long-sought black silver ore passed from hand to hand, they all said, "It is good enough for us," and concluded that at last they had discovered the place where Sullivan had found the "black stuff," the nugget silver. But they were in no condition to remain at that time to explore the locality or to make their prize more certain and secure. Travel-worn, weary, and saddened by the loss of their comrade, and without provisions, they hastened on to the settlement on the Gila, at Florence, crossing the dreaded desert at night. The next day, jealously guarding their secret, they gathered supplies together and hastened back to the discovery-point. There, sure enough, they found the little black nuggets strewing the surface, and mineral stains, of many colors, including green and blue, in the substance of the rock. The long-sought treasure was found at last. Sullivan's discovery was no longer his alone. Standing upon the highest point of the mineral-stained rock, they made the Silver King location, fifteen hundred feet long in an easterly and westerly direction, and six hundred feet wide in a northerly and southerly direction. This was on the 22d day of March, 1875. It was the initial location of the mining district now known as the Pioneer Mining District. This district was immediately laid out, or designated, as twenty miles square, extending ten miles each way from the initial point of the Silver King location, with the bounding lines running north and south, east and west. This location, and the location of the claim, were properly made in accordance with the laws, and they were duly recorded in the county records at Florence, the county-seat.

The ownership of the location of the Silver King claim was then equally divided between the four survivors of the party of five, each holding one fourth. On the 30th of June, 1876, Isaac Copeland sold his one quarter to Charles G. Mason, and William H. Long sold his one quarter to Benjamin W. Reagan. On the 9th of January, 1877, Charles G. Mason sold his one half to Col. James M. Barney, and on the 5th day of May, 1877, the Silver King Mining Company was incorporated under the laws of the State of California. On the 9th of May, 1877, James M. Barney and Benjamin W. Reagan deeded their entire interests in the mine to the incorporation.

The title to the mine is thus continuous and perfect, and is in accordance with the laws of the United States governing the occupation and working of mineral lands. The mine has been worked continuously, and since the incorporation to the present time, and it promises to be prominent as the leading silver mine of the country for years to come.

One day, two years ago, an aged man came slowly into the thriving settlement at Picket Post, and with great idterest wandered about the Silver King mill, where twenty stamps were day and night merrily pounding out silver from the rock. The man was evidently in need of help, and soon went to the office of the company and announced himself as Sullivan, the old soldier, the original discoverer of the vein, and humbly asked for work. Although long before he had been given up as dead, and very few of his old acquaintances survived, he was identified beyond a doubt, and was immediately taken into the company's service by the day. His story, was briefly told, as follows: On leaving Mason's rancho, he crossed the wide deserts to the westward as far as the Great Colorado River, and beyond it into California. Being penniless, he had sustained himself by working as a farm hand in California. Always hoping to obtain sufficient means to return to Arizona and secure the benefits of his discovery, he had labored on year after year, looking vaguely forward, and keeping the secret of the locality to himself, until one day he heard of the discovery of the rich deposit of silver by Mason and others. He was convinced that the place had been found, and that he had lost his chance of making the location for himself. Although without any ownership or right in the location, as made by Mason and his friends, and disappointed in his long-cherished hope, he could not resist a desire to return and see the result of the opening of the mine.

Situation, Accessibility, Climate.—The Silver King mine is situated near the base of the southwestern slope of the Pinal Mountain range in Pinal County, Arizona territory, at an elevation of 3700 feet above the sea. The location overlooks the country to the southward as far as the Mexican line, and westward, the vast plain of the Gila and Salt rivers to Phœnix, and beyond. This plain, now comparatively treeless, sterile, and desert-like, was once the seat of ancient civilization, as shown by the numerous ruins of buildings, and the profusion of fragments of pottery strewing the surface; but there is no evidence that the dwellers of the plain had ever discovered the wealth that lay hidden in the King Mountain.

The road from the mine leads for a few miles down the foot-hills and then over the nearly level plain for about thirty-five miles to Florence, on the Gila River, the county-seat of Pinal County. Beyond this town, the

road continues over the plain to Casa Grande station, on the Southern Pacific Railroad of Arizona, nine hundred and thirteen miles from San Francisco. The natural road, now also the county-road, is excellent at all seasons, and the drive from the railroad station can be easily made in eight or nine hours. The mine may be reached from San Francisco in fifty-three hours, or five and a half days from New York, and at all seasons without embarrassment by snow, which renders so many of the important mines of the country comparatively inaccessible in the winter season.

The mill of the company is at the town called Pinal, on Queen Creek, five miles from the mine. Pinal is at an elevation of 2400 feet above tide. It is connected with the mine by a good road, and by telephone. At Pinal, the offices of the Silver King & Florence Telegraph Company give direct telegraphic communication with the Western Union lines.

The climate of the region is salubrious, and is particularly delightful in winter, as severe frosts are unknown. The air is remarkably clear, the days are warm, and the nights are cool and refreshing. In summer, the great heat of the day is tempered by the dryness of the air, which promotes rapid evaporation from the skin, and keeps down the temperature of the body. There is no interference with mining or milling operations, or loss of time due to the climate.

A project for a railroad leading northward from the Southern Pacific Railroad to the Silver King mine, and beyond it, is now under consideration, and in all probability a road will be built in the near future. Such a road would not only make the mine accessible in a shorter time than is now required, but would reduce the cost of freight on machinery and supplies, and afford a cheaper outlet for the ores and bullion. The configuration of the country is especially favorable for railroad construction, particularly as far as the foot-hills ;| for it isnearly all a continuous, level, gravelly plain, without streams or cañons, and requiring little or no grading. (TO BE CONTINUED.)

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

RECENT RULINGS OF THE COMMISSIONER.

By a recent ruling, the claimants of mill-sites are permitted to cut and remove timber thereon for the purpose of constructing mills, reduction-works, tramways, or other accessory required in developing their mining interests. In permitting the removal of timber from a mill-site or tract of non-mineral land, prior to the issuance of a patent therefor, it is strictly forbidden to make such timber an article of sale for private gain or speculation.

The law recognizes two ways by which title to a placer claim may be shown: one by a duly certified abstract; and the other, under the statute of limitations.

A final certificate received at the General Land-Office is made out to John Doe *et al.* The commissioner advises the local offices that *et al.* is altogether too loose and indefinite a basis upon which to issue a mineral patent.

A local attorney asked the commissioner to dismiss an application for patent because no appearance had been entered here on behalf of the party. The commissioner says: Should the motion come properly before me for consideration, I shall require advice as to the rule which makes a failure to employ resident counsel sufficient ground for dismissing an appeal without considering the merits of a case.

Concerning the right to order a hearing, the commissioner considers it proper in the exercise of his discretion to order a hearing upon whatever question of fact arising in a case and at whatever stage of the proceedings he pleases. When entry is made of a mining claim and the money paid for the land, the receiver of the local land-office in which the claim is entered fills out two receipts for the amount paid: one of these is transmitted with the final certificate of entry and the papers and the application for patent to the General Land-Office. The other receipt is given to the purchaser. When patent is issued, it is delivered to the party holding the duplicate receipt, who surrenders the same. An attorney for the owner or any one else holding the duplicate receipt can obtain possession of the patent. Usually this receipt is held by the attorney attending to the business of the claimant.

Application for patent and publication of notice thereof, as required by law, do not exempt a lode claimant from making the annual expenditures thereafter upon his claim. That requirement ceases only after payment of the purchase-money and entry in the local land-office.

"A" filed an application, and due publication was made. He failed to prosecute his claim, and the case rested, when "B" appeared at the local office and made a motion to dismiss the proceedings, in order to make application for patent, basing such motion upon a certificate of subsequent relocation and a decree of court in an action commenced by "B" against "A" to quiet title, which decree was rendered through the default in appearance of "A." The Commissioner of the General Land-Office refused to dismiss "A's" application upon such a showing, holding that the courts had no jurisdiction at that stage of the proceedings; that the question of abandonment after the period of publication prescribed by law is one which must be determined by the Executive Department after an investigation. "B" appealed from this ruling to the secretary, who ordered a hearing to determine the question of abandonment before relocation.

The question of a disputed mining title is always one for judicial investigation, and can in no instance be determined by the General Land-Office.

Application for patent can not be received at a local land-office for a lode claim embracing a portion of the surface ground of a claim for which an application has been previously filed and is still pending; but when an application has been properly refused a filing, the subsequent application for a patent for another lode should be received, although including part of the surface claimed adversely by others.

Where non-mineral lands have been fraudulently entered under the mining laws, disinterested parties may, at any time before patent issue, lay the facts before the General Land-Office, supported by affidavits of reliable persons; and, if sufficient to establish a *prima-facie* case of fraud or illegality, a hearing will be directed to be held by the local land-offices for the purpose of determining the truth of the charges made, and, if substantiated the entry will be canceled.

The rule which forbids the reception of an application for patent to a mining claim which conflicts with a claim embracing a prior pending application is derived from that provision of the statute which prescribes the method of filing adverse claims. Where the statute prescribes one way in which a thing shall be done, it precludes every other. It is easy to see that this rule is a salutary one; for were it otherwise, application after application might be accumulated in the localo ffice all relating to the same land, thus nullifying the law which requires adverse claims to be filed and prosecuted. A suit upon an adverse claim, commenced after the period prescribed by law has expired, does not justify the suspension of proceedings for patent.

Coal lands were never subject to location with Sioux or California University scrip.

FOREST FIRES.

Professor C. S. Sargent, who has charge of the forestry statistics of the census, has presented a paper on forest fires at a meeting of the Massachusetts State Board of Agriculture, from which the following parts have been chosen as particularly interesting by the editor of the *Journal* of the Charcoal Iron-Workers:

The division of the tenth census which has been specially engaged studying the forests of the country has endeavored to gather statistics of the extent and value of the forests burned during the year 1880, and, though the results obtained have not yet been published, there is every reason to believe that the extent of forest fires through the country is infinitely greater than has ever been seriously supposed. In Massachusetts, the amount of property destroyed in this way is naturally shown to be comparatively small; and yet, in the year 1880, some 13,899 acres of land were burned over, the loss being given at over $100,000. In Pennsylvania, where the value of forest property is more appreciated than in Massachusetts, and the lumbering interests are only second to those of Michigan, 685,738 acres are reported burned over during the year, with a loss of over $3,000,000. It is not probable that these statements are exaggerated, and in the case of Pennsylvania they undoubtedly do not represent the actual loss from this cause.

An important fact, which probably very rarely receives due attention, is, that forest fires destroy not only growing wood, but the fertility of the soil itself. In treating of forest fires, we generally consider only the immediate damage and pay little if any attention to the greater loss which the land itself suffers from being burnt over. If only a portion of the trees growing on a tract of land are cut, and a sufficient number is left to protect the soil and produce a supply of seed, the same species will continue to grow almost indefinitely. If, on the other hand, a forest is destroyed by a fire which kills the trees and undergrowth of shrubs and herbs, the same species, except in the case of some of our least valuable trees, rarely spring up again. If a forest of white pine is destroyed by fire, this tree does not spring up again, as it would under proper care, and the land is not covered again with any growth of trees for a considerable period. The fire-weed first makes its appearance. The light seed of this plant is often blown for a long distance, and, falling upon the bare ground, germinates quickly, and finally covers the burnt surface with vegetation. Birds drop the seeds of raspberries and blackberries, which find sufficient nourishment and light for germination. These, as they grow, cover the ground and afford protection to the stones of the little Moreton cherry, dropped by birds also, or to the light seeds of the gray birch, or some of the willows or poplars, which are constantly blowing about, and will germinate anywhere upon any unshaded ground. These are generally the first trees which succeed a fire-swept pine wood. Years, however, elapse before the ground is covered again even with such trees.

The cherries and the birches and poplars are short-lived, and are succeeded by more valuable broad-leaved trees. Squirrels and other animals deposit acorns in the ground, and the wind brings the seeds of maples, ashes, and the valuable birches. Such seeds find protection among the poplars and willows which had sprung up, and, as these die, the more valuable trees get a chance to grow, and gradually occupy the ground. This new forest of hardwood trees, if protected from fire, will occupy the ground for a long time, and the original pine will not appear again until the land, long enriched by an annual deposit of leaves, has been once more stripped of its tree-covering and mellowed by years of cultivation. Such land, nearly all over New England, if freed from the plow or the scythe, and guarded from fire and pasturage, grows up again with pine.

The forest fire, then, which destroyed the pine destroyed as well the capacity of the land to produce a similar crop for a period of from fifty to one hundred years. The damage inflicted upon the land is, of course, not irreparable in a climate like that of New England, where the annual rain-fall is sufficient always to insure a growth of trees of some sort upon undisturbed ground, and sooner or later, in the ordinary workings of nature's laws, forests will succeed each other here; but in some parts of the country, where the rain-fall is so slight that there is a constant and severe struggle between the forest and the plain, and where trees under the most favorable conditions barely exist, a fire not only kills the forest, but it makes any future growth of trees impossible.

There is little inducement to plant or protect and encourage the growth of natural woodlands so long as the condition of public sentiment is such that the authors of forest fires are not held responsible for their acts. It is safer to cut it off for cordwood at the earliest possible moment, and thus reduce the risk of probable loss. Under these circumstances, it is useless to adopt any of the methods of thinning or pruning by which the value of young forest-trees for timber may be vastly improved, or to guard the woods from roaming and destructive cattle. Even in a State like Massachusetts, where the value of all forest products is enormously high, capital will not take the risk of forest culture, although it might be made most profitable under a wiser management.

Not a small part of central and southern New England, no longer profitable for agriculture, is now growing up with white pine, and this, if it can only be protected, will, it is thought, soon exceed in value the net profit upon all the New England farms. In some parts of New England, this second growth of pine has been growing for a considerable time, and has already given rise to large and profitable industries. The value of logs cut in Massachusetts during the census year reached nearly $2,000,000. At least one half of these logs were of second-growth pine. More than

100,000,000 feet of second-growth pine were sawed during the same year in Vermont and New Hampshire, and nearly, if not quite, as much more in Maine.

The census investigation showed that in Massachusetts, during the year 1880, 52 forest fires were set by sparks from locomotives; that 40 spread from carelessly burned brush-heaps; that hunters caused 37; that nineteen careless smokers dropped their lighted cigars or burning ashes from their pipes, and so caused disastrous conflagrations. In three instances, the origin of forest fires is ascribed to the burning of charcoal, and in only eight cases to malice. It appears, then, that the railroads are responsible for the greatest number of these fires, and that the remainder may be generally traced to sheer carelessness. As a first step toward checking this evil, railroad corporations should be compelled to provide their locomotives with spark-consumers. Another act is needed to compel the collection and burning during the winter in which the trees are cut of every part of them not carried away. A criminal act is also demanded for the punishment of any who shall maliciously or carelessly set fire to growing wood. On these points, however, it is more important to educate public opinion than to frame or pass laws which will only be enforced when people feel the need of them. A full understanding of the forest question is the best guarantee that woods will be protected and receive the care which, in their economic aspect, if in no other, they deserve.

THE IRON TRADE IN THE NORTHWEST OF GERMANY IN 1882.

German iron-masters possess an association whose aims and methods are very similar to those of kindred bodies in Great Britain and in this country. Germany is the third in the rank of producing countries, and and in some specialties sends important quantities of iron and steel to the United States. Indirectly, the growth of the German iron trade has affected our own, as robbing Great Britain of a valued customer and, in some instances, creating a competition in other markets.

The year 1882 was a dull one in the German iron trade, consumers holding off, and a serious decline in prices was averted only by combination of producers. The latter were assisted in their endeavors by the large contracts for railroad material entered into. An exceptionally good crop also created a demand for merchant shapes and bars, particularly in the eastern section of the country, stocks in speculators' and dealers' hands having run down during the preceding period of inactivity. Another feature of the year was the fact that the pending exceptional increase in the Russian duties on wire and wire-rods led the works interested in that specialty to drive at their utmost capacity, in order to make heavy deliveries previous to the enforcement of the new tariff. This summer activity was lost in the winter, and at the close of the year dullness set in. The production in the northwest of Germany, including the Rhenish Provinces, the Siegen District, Westphalia, and Nassau, but excluding the works on the Moselle and Saar rivers, was as follows:

	1881.	1882.	Increase (+) or Decrease (−)
High-Grade Forge Pig.			
Stock, Jan. 1, tons	24,157	7,545	− 16,612
Production, "	545,620	637,612	+ 91,992
Consumption and sales, tons	562,232	621,900	+ 59,668
Stock, Dec. 31, "	7,545	23,257	+ 15,712
Ordinary Forge Pig.			
Stock, Jan. 1, tons	2,595	522	− 2,073
Production, "	81,622	159,127	+ 77,505
Consumption and sales, tons	83,695	151,504	+ 67,809
Stock, Dec. 31, "	522	8,145	+ 7,623
Spiegeleisen.			
Stock, Jan. 1, tons	7,774	2,846	− 4,928
Production, "	97,055	109,787	+ 12,732
Consumption and sales, tons	101,983	102,698	+ 715
Stock, Dec. 31, "	2,846	9,935	+ 7,089
Bessemer Pig.			
Stock, Jan. 1, tons	6,613	10,971	+ 4,358
Production, "	224,718	414,948	+190,230
Consumption and sales, tons	220,360	413,035	+192,675
Stock, Dec. 31, "	10,971	12,884	+ 1,913
Foundry Pig.			
Stock, Jan. 1, tons	14,735	8,901	− 5,834
Production, "	120,133	113,608	− 6,525
Consumption and sales, tons	125,967	119,598	− 5,969
Stock, Dec. 31, "	8,901	2,911	− 5,990

The total output of Germany in 1882 and 1881 was 3,170,957 and 2,914,009 metric tons, of which this district made 1,435,082 and 1,069,148 tons respectively. The imports and exports of pig-iron in Germany were:

	1882.	1881.	1882.
Imports	282,958	244,601	Inc. 38,357
Exports	186,938	245,496	Dec. 58,558

This decrease in the exports is looked upon as a good sign for the activity in the home markets, while the increase in the imports is considered a proof of the heavy disadvantages which high rates of freight cause the German pig-iron industry to labor under. It is generally assumed that two sevenths of the imports are Bessemer pig, while five sevenths are foundry iron.

In regard to other branches of the German iron and steel trade, the following figures of imports and exports will be of interest:

		1882.	1881.
Old and Scrap	Import	8,048	5,644
	Export	59,315	67,073
Billets and Ingots	Import	683	330
	Export	32,957	40,677
Bars	Import	15,779	14,258
	Export	144,397	152,804
Tires and Plow-shares	Import	38	47
	Export	14,052	15,567
Angles and Tees	Import	199	71
	Export	3,695	4,554
Rails	Import	663	1,495
	Export	186,053	250,708
Track Material	Import	173	297
	Export	11,596	11,981
Axles, Wheels, etc.	Import	239	171
	Export	11,822	17,083
Plates and Sheet	Import	3,156	3,053
	Export	44,204	40,932
Wire Rods	Import	3,480	3,276
	Export	227,415	159,416
Wire Nails	Import	23	32
	Export	23,877	21,710

The most interesting figures to Americans are those relating to wire, of which the Germans are the leading producers in the world. On the first of July, the Russian government raised the duty on wire-rods from 35 kopecks to 1 ruble 10 kopecks per poud, or an increase of 185·77 per cent, and as the Russian wire-mills produce only a portion of the quantity required by wire-drawers and nail-makers, they endeavored to obtain as heavy an amount of the supplies of raw material as possible. The German mills were therefore taxed to their utmost capacity, and the number of trains added to their plant was extraordinary, carrying the total number in the Northwest District, which is the chief producing section, to 51, so that fears are expressed of a danger of overproduction. The Germans are making great efforts to produce barbed wire. Hitherto this class of goods has been made almost exclusively from imported Swedish iron, but now it is made of soft steel hardened. The German makers complain that the duty, which is only one half of one per cent *ad valorem*, is too low to protect them against English competition, and they are clamoring for more. Some of the wire-makers complained that the duty on pig was checking them, and the manufacturers have accordingly, under certain circumstances, put down the price of the raw material for wire made for export. The German wire-makers are besides urging the railroad managers to give them special drawbacks on freights on exported material, and the fact that such concessions have been made on exported rails seems to give them grounds for hoping that they will succeed.

It may be noted that the Siegen spiegeleisen producers are also dissatisfied with the railroad rates, notably on coke and on metal for export.

PROGRESS IN SCIENCE AND THE ARTS.

Electric Torpedo-Boat.—A torpedo-boat has just been satisfactorily tried at Constantinople, in which a Siemens electro-motor drives two screw propellers in the rear of the boat. The vessel is cigar-shaped, and moves under water at the rate of eight knots an hour. Its path is traced in the daytime by a wire which projects above the surface, and is followed by a telescope; in the night, by a lantern having an opening only toward the shore, and a light too feeble to betray itself to the enemy by reflection. The place in which the torpedo-boat was tried furnished a severe test on account of the strong currents, which vary in direction in different parts of the channel, and in strength from one part of the day to another. The wires conveying the explosive discharge are, of course, distinct from those carrying the motive current.

Preventing the Corrosion of Steam-Boilers.—In concluding a valuable paper on steam-raising waters, published in the Journal of the Society of Chemical Industry, Mr. W. Ivison Macadam, F.I.C., says: "Clarke's process, the addition of milk of lime, is suitable; but the space required for settling is against the general adoption of the method. The addition to the feed-water of caustic soda, or, still better, of soda-ash, and at the same time raising the temperature by utilizing waste steam or heat, would be beneficial in most cases, care being taken to afterward settle or filter the water. Soda-ash was first recommended in the columns of the *Times* of March 17th, 1864, by Mr. Peter Spence, of the Manchester Alum-Works, who says: 'For every boiler 2 pounds of soda-ash—an article easily procured at 1¼d. per pound—is every day given to the stoker. This he dissolves in a bucketful of cold water, and puts the solution into the water supply for the boilers. This he does as part of his imperative daily duties, and the consequence is, that now not the slightest corrosive action takes place, an additional advantage being that no crust is ever formed in my boiler, all the lime-salt that forms these crusts being also destroyed by the alkaline solution.'"

Paper Doors.—In the use of wood for constructing doors, great difficulty is experienced from the shrinkage, swelling and warping to which the material is subject, while the general use of metal for such purposes is rendered impracticable by its weight. To obviate these objections, a door composed of two or more sheets of paper-board, secured together and rendered homogeneous, has been devised. The following description is furnished by the *Manufacturer and Industrial Gazette:* Boards of properly prepared paper are taken, each having the requisite dimensions for a door, and a thickness of one third or one half the proposed thickness of such door, and within the outer board or boards, openings are cut that correspond in size, shape, and location to the ordinary panel-openings. The edges of these opening are preferably molded, but, if desired, may be left plain and separate moldings may be secured thereon after the door is completed. The outer boards thus constructed are then coated upon their inner faces with a suitable adhesive mixture, preferably composed of forty- nine parts of glue and one and one eighth part of bichromate of potash dissolved in water, and placed upon opposite sides of a central panel board, after which they are passed between rollers and subjected to a heavy pressure, which cause the boards to firmly adhere to and become practically homogeneous. The door may now be covered with any desired fire or water-proof coating, and then painted in the ordinary way, after which it may be hung and trimmed in the usual manner, and from the nature of the material employed is free from all changes which are produced by atmospheric causes upon wood, costs much less than metal, and has less weight even than a door constructed from pine.

Discharging Torpedoes.—It is well known that the problem how best to discharge Whitehead torpedoes presents considerable difficulty, and many attempts have been made to devise a satisfactory mechanism. It appears that Messrs. Yarrow have settled the question so far as torpedo-boats are concerned. Some interesting trials took place at Westminster on the afternoon of the 9th, in the presence of Admiral Sir Cooper Key, First Sea Lord, Rear-Admiral Brandreth, Controller of the Navy, Mr. George Rendel, and Mr. Nathaniel Barnaby, with a second-class torpedo-boat recently built for the English government by Messrs. Yarrow & Co., in order to illustrate the new system of steam impulse introduced by them. The gear is similar to that recently tested at Portsmouth with great success, it being found very superior to the plan previously adopted. The arrangement consists in building two troughs inclined at an angle of 5 degrees in the bow of the boat, which are provided with suitable guides for carrying the Whitehead torpedo. Aft of these

troughs or guides are two long steel steam cylinders, 6 inches diameter and 7-foot stroke, the piston-rods of which press against the ends of the torpedoes, and upon steam being suddenly admitted into these cylinders, the torpedoes are instantly forced out with considerable velocity, the speed being estimated at about fifteen miles an hour. If, therefore, the impulse is given when the boat is going twenty miles an hour, the collective speed of the torpedo upon entering the water is clearly thirty-five miles an hour. The arrangement is exceedingly simple, and under the entire control of the steersman.

The Estimation of Sulphureted Hydrogen and Carbonic Acid in Coal-Gas.—Mr. L. T. Wright recommends the following method in a paper read before the British Chemical Society:

The crude coal-gas, dried and freed from ammonia by passing through phosphoric acid, is passed through two weighed U tubes, the first charged with roughly powdered cupric phosphate in one leg and calcium chloride in the other, the second containing soda lime—slightly moistened by exposure to the air for about eighteen hours—and calcium chloride. The increase of weight in the first gives the sulphureted hydrogen in the second the carbonic acid. The copper phosphate is prepared thus: Two pounds of ordinary phosphate of soda are dissolved in one gallon of water, and two and a half pounds of cupric sulphate in one and a half gallons of water. The two solutions are vigorously stirred together, the precipitate washed by decantation, and dried at 100 degrees C. Phosphate thus prepared absorbs hydrogen sulphide very perfectly. Before using the absorption-tubes, three cubic feet of clean dry coal-gas are passed through to "saturate" the reagents. The gas during the absorption should be passed at the rate of ¼ to ½ a cubic foot per hour. The total quantity must vary with the impurity in the gas. The sum of the hydrogen sulphide and carbonic anhydride, thus estimated, is always greater than the number obtained by absorbing these gases simultaneously in one U tube charged with soda lime. A 6-inch U tube charged with cupric phosphate will absorb twenty grains of hydrogen sulphide. A similar sized U tube, charged with soda lime, will absorb perfectly eighteen grains of carbonic anhydride. Dr. Armstrong suggested that some acetylene might be absorbed by the cupric phosphate.

Storage Batteries.—Prof. Henry Morton recently read a paper on the storage of electricity to the members of the New York Electrical Society, at the Stevens Institute of Technology, in Hoboken. Edison incandescent lamps lighted the room, a two horse-power Weston electric motor stood on the lecture-table, and the lamps and motor were furnished with electricity from the Sellon-Volckmar accumulators. Professor Morton briefly described the principles involved in the present methods of electrical storage. He then explained the structure of the Sellon-Volckmar battery, which consists of plates, each made of a fine lattice-work of metallic lead, filled in with a porous mass, which was in each alternate plate either metallic lead or the black peroxide of lead. The experiments made by the lecturer showed that each cell in the battery would yield a continuous current or about thirty-two ampères for nine hours, with an electro-motive force of about two and two tenths volts, a quantity of current sufficient to supply forty-four of the Edison incandescent lamps of 16 candle-power, without employing more than 50 of the cells to secure sufficient electro-motive force to overcome the resistance of the lamps. Each cell weighed only 80 pounds when ready for work, so that for each light of 16 candles, burning one hour, 10 pounds of battery should be provided, if it were used solely as a reservoir to contain the current required. Experiments with the lights in the room were made to show that the battery in many cases would only be required to act as a regulator, simply taking up a temporary excess of the entire amount of electricity used, and providing for a temporary deficiency. By connecting the lights directly with a dynamo, its current was made to fluctuate so that the lights flashed up or faded according as the current was strong or weak. By connecting the dynamo with the battery, so that any excess of current could flow into it, or any deficiency be supplied by it, the lights burned perfectly steady. Touching on the question of using the storage batteries as a means of driving street cars, Professor Morton said that his measurements showed that each battery of 80 pounds weight contained energy equal to about 1,800,000 foot-pounds, or sufficient to take a one-horse car full of passengers across town, or from one end of the city to the other.

The Proportion of Carbon Wasted as Soot.—Prof. W. Chandler Roberts, in his elaborate chemical report for the committee of the Exhibition of Appliances for the Abatement of Smoke, held in London some time since, gives the following evidence on the proportion of carbon wasted as soot. Professor Roberts says: Earlier experiments have indicated the limits within which this proportion of soot will probably be comprised. M. Delezenne estimated in 1855 that the proportion of carbon that escaped combustion in this form might be taken at five per cent of the total weight of fuel burnt in the grate, and that 6320 kilograms of soot fell in twelve hours on the town of Lille. But, as Emile Burnat, quoting Payen, pointed out in a valuable paper on the combustion of smoke in boiler-furnaces, the amount of finely-divided carbon produced in a certain *lamp-black* factory is only 3 per cent of the coal burnt, and therefore the amount of carbon in ordinary smoke must be much lower. In 1858, Mr. John Graham estimated that very black smoke does not contain more than $\frac{1}{10}$ per cent of the carbon of the coal burnt, and the accurate experiments of M. Scheurer-Kestner showed that in boiler-furnaces the loss of carbon in the form of soot never exceeds 1 per cent of the fuel burnt, while the mean loss is probably between ½ and ¾ per cent. A case, however, is recorded, in which a coal containing 69 per cent of carbon (burnt with an inadequate supply of air) thus lost an amount of carbon as soot equal to 2·03 per cent of the fuel burnt. As might be anticipated, the amount of soot is greater in the case of an open fire-place than in a boiler-furnace; but the evidence afforded by the results of the tests made at the exhibition, while possessing much interest, does not, unfortunately, render it possible to give a precise answer to the question, for the following reasons: Some of the soot must have been deposited in the flue before it reached the point at which the withdrawing tube was inserted; and there is reason to fear that in the withdrawal of flue-gas laden with soot through any form of slit or orifice in a tube, the gaseous and solid portions may not enter in exactly the ratio in which they exist in the chimney. In many cases, the flues were carefully swept before and after the trial, and the soot was collected and weighed. In an extreme case, in an open fire-place, no less than 2¼ per cent of soot, compared with the fuel burnt, was found in the flue at the end of the trial. In the case of three close stoves of careful construction, rather less than ½ per cent was found, while in some cases it fell to ¼ per cent, and in one case to $\frac{1}{20}$ per cent. Of course, these numbers do not include the amount escaping into the air. I may perhaps add that in a preliminary experiment, made with an ordinary open fire-place connected with a chimney by means of a sheet-iron pipe 6 feet long and 9 inches diameter, 17 pounds of bituminous coal were burnt in three hours, and no less than 0·61 per cent of the fuel burnt was collected in the pipe in the form of soot, while the soot that passed into the chimney was not collected. This 0·61 per cent of soot, after drying at 100 degrees C., yielded, on distillation at 300 degrees C., 12 per cent of an oily, strong-smelling mixture of hydrocarbons.

Lubrication.—A subject which does not generally receive the attention it deserves was brought before the members of the Manchester Association of Employers, Foremen, and Draftsmen, at a recent Saturday meeting, in an interesting paper read by Mr. J. Veitch Wilson, on the lubrication of ordinary bearings and of bearings and faces subject to the action of steam. Mr. Wilson dealt with the question in an exhaustive manner. With regard to ordinary bearings under normal atmospheric conditions, he laid down that the lubricants to be employed should possess the following essential properties: They must not give off inflammable vapor under 350 degrees Fahr.; they must not act upon the metals with which they come in contact, nor oxidize, which tended to spontaneous combustion and clogged the machinery; they must have body adapted to the work to be done; their boiling-point must be sufficiently high to prevent evaporation and secure durability, and their freezing-point must be low enough to insure regularity of feed from the oil-cups and convenience in handling. As the result of numerous experiments, he had become convinced that mineral oils were, if used alone, unsatisfactory lubricants; but bearing in mind the fact that mineral oils could now be obtained in every respect as safe as the finest animal oils, and that the admixture of mineral oil with animal or vegetable oils neutralized the acidity in the one case and the acidity and oxidizing tendency in the other, he was of opinion that the safest, most efficient, and most economical lubricants for all manner of bearings were to be found in a judicious mixture of animal or vegetable with good mineral oils. With regard to cylinder lubricants, the peculiar conditions were the liberation of natural acids from vegetable and animal fats by the action of steam and heat, the action of these acids on the cylinders, and the evidence that in these acids were constituent parts of all animal and vegetable fats and oils: they could not be removed by any process of refining. One of the lubricants largely in use was tallow, but that this was the cause of considerable injury to the engine cylinders he had abundant evidence to prove. From the mass of evidence he had collected upon the subject, he was convinced that, if care were exercised in the selection of the oil, and equal care in its preparation and application, hydrocarbon oil would be found thoroughly efficient as a cylinder lubricant, absolutely harmless and much more economical than tallow. Sometimes a small percentage of vegetable or animal matter was added, in order to increase the lubricating properties, and in his experience this had always been attended with favorable results. Hot-air engines might be lubricated on the same principle as steam-cylinders, but gas-engines presented a new and special feature, as in their case the lubricant was not only subjected temporarily to the intense heat of the explosion, but also came in direct contact with the flame, and was liable to be carbonized thereby. If, therefore, vegetable or animal oils and fats were objectionable in steam-cylinders, they were much more so in the cylinders of gas-engines.

THE SLIPPING OF MINE LOCOMOTIVE-WHEELS.—There has been complaint occasionally that mine locomotives give trouble underground, because the wheels are apt to slip, the weight of the engines not being great enough in comparison with the duty they are called upon to perform, because their dimensions are restricted by the size of the drifts and galleries. Besides, escaping steam and smoke make the rails slippery, so that a grade of two per cent is considered a maximum by many. The frequent use of sand-boxes is objectionable, because it tends to destroy the rails more rapidly. In the Mazenay iron mines, the observation was made accidentally that throwing a jet of water upon the rails considerably increases the friction. A condensation water-cock broke accidentally, and a mixture of water and steam flowed on the rails at a point where the grade was 1½ per cent, and where usually the wheels slipped. No trouble at all was experienced that time, and since then, special cocks have been provided, which are opened when the steep grade is reached, throwing water from the boiler upon the rails. Since the introduction of this simple experiment, there has been no difficulty whatever.

DUST-CHAMBERS FOR BLAST-FURNACES.—In order to avoid the inconvenience attending the cleaning of brick stoves for heating the blast by the waste gases from their iron blast-furnaces, the managers of the new St. Nazaire works, France, have put up dust-chambers. The furnaces, of which there are two, are 19 meters (62·34 feet) high, have a 5-meter (16·4-foot) bosh, and are designed to smelt Spanish and Segré (Anjou) ores with Welsh coke. The velocity of the gases carried from the furnaces to the Whitwell stoves was computed at about 21 feet, so that no chance would be afforded the dust carried along to settle in the flues, and for this purpose large sheet-iron boxes were built, with the object of forcing the gases to travel in thin sheets over long stretches of sheet-iron and settle the dust previous to its entering the stoves. Herr J. H. C. Steffen, in a recent issue of *Stahl und Eisen*, gives the details of the construction of these dust-settlers. In running on Spanish ores to the extent of 80 per cent. of the charge, the average quantity of dust gathered per week was 45 cubic feet. On the second furnace, which had not yet been at work at the time when the St. Nazaire establishment was visited by Herr Steffen, a different plan, based upon the idea of diminishing the velocity of the current as much as possible, was to be tried, and accordingly, dust-chambers of a different design were built. As yet, no data as to the merits of the two plans are available.

Profits in the Manufacture of Dynamite.—The report of the directors of the Nobel Explosive Company, Glasgow, showed a net profit for the year of £58,087 14s., in addition to £9737 1s. 3d. brought forward. The output of the various articles manufactured by the company, and their ultimate conversion into dynamite, blasting gelatine, detonators, and electric fuses, has considerably increased during the year, with the exception of the sulphuric acid, which was slightly decreased, owing to the necessary repairs of chambers. The cost of manufacturing nitroglycerine was considerably greater than during 1881, owing to a further advance in the price of crude and refined gelatine. But for this, the balance of profit for the year would have been greater. The cost of nitro-cotton, fulminate of mercury, detonators, and electric fuses compares favorably with that of 1881. The demand for the company's manufactures, both at home and abroad, has continued to increase, and has taxed the producing powers of the factories to such an extent that the dynamite and blasting gelatine had to be dispatched from the Ardeer factory more frequently, and in smaller shipments than usual. In order to assist in the more rapid delivery of the explosives, the directors were compelled to charter an extra steamer during the whole of the past year, the expense of which has enhanced the cost of production. For a length of time, it has been evident to the directors that the steadily increasing demand for dynamite and blasting gelatine would soon overtake the company's powers of production, and after obtaining government sanction for the necessary extension of the works, they decided about a year ago to erect a duplicate factory. With this view, it became necessary to acquire more land, and they have now the pleasure of reporting that they have purchased, at a cost of £10,000 sterling, 240 acres of ground from Mr. Patrick Warner, which will give them ample scope for their future operations. This additional factory is now approaching completion.

A Curious Case of Corrosion of Steel.—Professor Munroe, of the United States Naval Academy, has contributed the following to the *Journal of the Franklin Institute:* Through the kindness of Chief-Engineer Farmer, my attention has recently been called to the appearance of two cold-chisels found in the United States steamship Triana in 1874, and which have since been preserved in the Department of Steam Engineering at the Naval Academy. These chisels were taken from the channel-way leading from the jet-condenser, and were located between the foot-valve and the air-pump. Both chisels were of steel throughout, as was proved by tempering the head. For use, of course, only the points had been tempered. During the time of exposure to the action of the salt water in the channel-way, the chisels were deeply corroded; but the corrosion was confined entirely to the soft metal, the tempered points not being attacked in the least. The corrosion was deepest at the line of contact between the tempered points and the untempered metal of the haft. The line of immersion, on tempering, is as distinctly marked as if drawn with a shading-pen. Since meeting with these chisels, I have heard of a similar case of corrosion, although the object has been lost. It was a hammer which had been taken from the boiler of a merchant vessel, the tempered faces of which were intact, while the soft metal was corroded. Remembering the heated discussion going on in metallurgical circles on the question, What is Steel? I shall not attempt to decide whether the change which takes place in the tempering of steel is a chemical or a physical one; but it is evident that this change produces a body which is not so readily acted upon by salt water as untempered steel is. It is also probable that, when the untempered and tempered steels are brought in contact in the presence of salt water, we have an electro-chemical couple, and that this hastens the destruction of the untempered metal. I beg to suggest that this observation may have a practical bearing upon the construction of steel ships.

Estimating the Contents of Highly Plicated Anthracite Coal-Beds.—At a meeting of the Engineers' Club of Philadelphia, Mr. Charles A. Ashburner read a paper on a New Method of Estimating the Contents of Highly Plicated Coal-Beds as applied to the Anthracite Coal-Fields of Pennsylvania. The questions of the future production and ultimate exhaustion of these fields are of the greatest importance. In 1860, the population of the United States was 31,443,321, and 8,513,123 tons of coal were produced, that is, actually shipped to market; in 1870, the population had increased 22 per cent (38,558,371) and the production of anthracite was nearly doubled, being 16,182,191 tons. For the year 1880, with a population of over 50 millions, the product was 23,437,242+ tons. In 1882, the actual production was over 30,000,000 tons. It has been variously estimated that the 470 square miles containing this coal in Pennsylvania will be entirely exhausted in from 140 to 204 years. While Mr. Ashburner does not estimate the ultimate exhaustion, he has devised a method for estimating the contents of these fields from data which the careful and practical geological and mining examinations of the State Survey are now affording. The exact position and detailed structural shape of the coal-beds are first mapped by 50-foot contour-lines along the floor of the beds, giving, completely and satisfactorily, their geometrical construction and shape. These surfaces are then developed into planes, by the development into straight lines of the line of the bed as cut by paralleled section planes 1600 feet apart. This graphical method is attended with errors which are mathematically discussed, and which have been formulated by Mr. Arthur Winslow, member of the Club. This method does not give the true area of the surface of a sphere, cone, or triangular trough. In the case of a sphere, it gives $\frac{\pi}{4}$ of the true area: in a cone, the error increases directly as the secant of the angle which the pitch of the cone makes with its axis; and in a triangular trough, which more nearly represents the shape of the anthracite basins, the error is very much less. A practical test has been made of this method in the Panther Creek basin, between Mauch Chunk and Tamaqua, and the maximum possible error in estimating the surface area of the coal-beds was found to be ·905 of 1 per cent. After the areas are thus found, the contents are obtained by careful measurements made in the mines, to ascertain the actual number of tons of coal which are contained in a unit (1 acre) of bed area. In this way, it has been estimated that the above basin originally contained 1,032,000,000± tons; that the area under development originally contained 92,000,000± tons, out of which latter area 54,000,000± tons have been taken.

FURNACE, MILL, AND FACTORY.

The Colorado Smelting Company has broken ground and begun the construction of large smelting-works at Pueblo. The iron work, including furnaces and two large engines, is manufactured at the extensive shops of Hendey & Meyer in Denver. The furnaces are to be of a size larger than has heretofore been used in Western smelting, having twelve tuyeres instead of eight or ten. Mr. Anton Eilers, widely and favorably known among smelting men, is to be metallurgist of the new works.

On the 13th inst., fire caught in the charcoal sheds of the Midland Blast-Furnace Company, at Midland, Mo., from a spark from the furnace, destroying about 100,000 bushels of charcoal and two large sheds. The loss, about $12,000, was covered by insurance, but the incidental loss by enforced stoppage will amount to considerably more. It was only by the most faithful efforts of the employés that the entire furnace property was saved from destruction. President Lee writes to the *Age of Steel* that several men covered themselves with wet blankets, and stood in the face of the fire and worked to save the company's property, while their own household goods, which wives had carried out of houses, were suffering destruction. He distributed $250 among four of the most faithful men, besides paying them enough to cover their own losses. The furnace will be idle for several weeks, until a fresh stock of charcoal can be made.

The employés of the pipe-mill of the Reading Iron Company on April 20th appointed a committee to wait upon the proprietors, to demand the restoration of wages paid previous to last August. The company denied their request. Superintendent Wolf stated that there was not work enough on hand to keep the men employed. The sheet and iron rolling-mills are also idle. The nail factory of the company has been out of operation for two years. The furnaces, foundry, and forge are running full blast.

Contracts for the construction of eight vessels have been secured by the American Ship-Builders of Philadelphia. Four hundred Edison electric lights will enable work to be carried on at night as well as day. Four hundred men are at present employed. A 140 horse-power engine is 22-inch cylinder and 48-inch stroke. The keel of ship No. 1 will be begun on Monday, and there is yard room for ten in all. The machinery was started up on Thursday of this week.

G. S. Wormer & Sons, of Chicago, are building for the Marinette Iron-Works Company, of Florence, Wis., one 30 and one 25 horse-power portable boiler and a double 6¼ by 8 friction-drum hoisting-engine; for the Lumberman's Mining Company, Iron Mountain, Mich., a 54 by 16 tubular boiler and fixtures complete; for James A. Allen, Fort Howard, Wis., one friction-drum hoisting-engine and boiler; for the Metropolitan Iron and Land Company, Metropolitan, Mich., double-cylinder 10 by 12 friction-drum mining-engine.

The Webster, Camp & Lane Company, of Akron, O., has recently shipped to the Cleveland Iron Mining Company, at Ishpeming, Mich., a hoisting-plant consisting of four drums 8 feet in diameter with face surface sufficient to coil 1300 feet of rope. The drums are to be operated by a pair of engines 22 by 42 inches, and will have a hoisting capacity of 140 tons. This company has also recently furnished the Iron Mountain Mining Company, of Iron Mountain, Mo., a hoisting-plant consisting of two 5-foot drums and one 8 by 32-inch engine, and is now constructing a plant of four 8-foot drums for the Lake Superior Iron Mining Company, and also several different hoisting apparatus, some to go Colorado and some to Montana.

The Buckeye Bridge and Boiler-Works, in Cleveland, O., have several heavy contracts for boilers, and are making 1¾ miles of boiler-iron tubing for compressed air, for a mining company in the Lake Superior region.

The Lake Shore Tube-Works Company, of Pittsburg, was chartered recently, with a capital stock of $25,000, divided into 250 shares of $100 each, and held by the following persons: William L. Hurd, McKeesport, 25; Peter Patterson, McKeesport, 10; James B. Murray, McKeesport, 10; J. M. Converse, Pittsburg, 50; James B. Converse, Pittsburg, 50; James H. Flager, trustee, New York City, 105.

Robert Hogsett is now sole owner of the Lemont Furnace, in Fayette County, Pa., having purchased the half-interest of his partners. The consideration is not known.

The mechanical puddler which recently gave the Phœnix Iron Company so trouble made four heats last week, and did the work admirably, so far as the puddler is concerned; but it is now found that the engine for drawing it is too light for the work, and that the furnace will not melt the iron fast enough to supply the molten iron to keep one of the puddlers in operation. It was thought it would be ample for two of them. These defects will be remedied, another furnace will be built, and a new and larger engine substituted for the one now in use.

The Monongahela Manufacturing Company, Monongahela City, Pa., was reorganized January 1st, 1883, and the capacity of the works was largely increased by putting in new machinery. It is also still adding to its extensive works. It manufactures steam-engines, hoisting machinery, and general supplies for coal mines; pit-cars, pit car-wheels, frogs, and turn-outs; sheaves, drums, etc.; and complete outfits for tipples. Mr. Kelly, the president of the company, was for a long time with the Pittsburg Locomotive-Works, and with A. Garrison & Co. Mr. T. H. Pollock has had charge of these works for over seven years. Previous to this time, Mr. Kelly was superintendent of Witherow & Gordon's works, at New Castle, Pa.

Stack No. 2 of the Franklin Iron Manufacturing Company, Oneida County, N. Y., was blown out for repairs March 23d, after a successful blast of three years and three months. The repairs in progress include raising the stack from 54 to 70 feet, the erection of regenerative stoves, 18 by 60 feet, under the supervision of John M. Hartman, and erecting two blowing-engines, 84 and 40 inches by 4½-foot stroke, made by the Cuyahoga Works, Cleveland, Ohio. No. 1 furnace is in operation, making 300 tons foundry iron per week.

Recently, a large spur-wheel for an engine was cast at the steel-works of the Cambria Iron Company, in Johnstown, Pa. The mammoth ladle contained upward of 20 tons of molten steel, 15 tons of which were poured without the slightest trouble.

The Lehigh Car Manufacturing Company, at Stemton, Pa., whose shops have been idle several weeks for want of orders, has contracted with the Lehigh Coal and Navigation Company for building 500 coal-cars.

The Lochiel rolling-mill property, at Harrisburg, has been sold to Senator Don Cameron for $100,000. It is said that the purchase was made for the Harrisburg & Western Railroad, on which to establish the shops of the company. The furnace was not included in the sale.

GENERAL MINING NEWS.

CALIFORNIA.

INYO COUNTY—BEVERIDGE DISTRICT.

The Inyo *Independent* gives the following items:

A large number of the men are at work on the different mines getting out ore. Two mills are running constantly, and it is said that there is enough ore in sight to keep them running all summer.

SWANSEA DISTRICT.

A number of men are busy in this district, prospecting and developing claims for smelting ores. The large number of fine prospects already located and partly opened, and the probability that first-class smelting-works will soon be erected on the lake, have given an impetus to mining in that section.

Brown Monster and Hersch Mines.—These mines are situated in the Inyos,

nine miles from Independence. The ore carries gold and silver. The mill has 30 stamps, in six batteries, and the cost of running them by water-power is very small. The Brown Monster is opened by an incline shaft to a depth of nearly 500 feet, and shows a large blue and regular vein of quartz its entire length. The Hersch mine has not been prospected to the extent of the former mine, there being about 100 feet of shaft and tunnel openings; but as far as can be seen, it shows a vein of great strength, with a width of four feet, and all pay-ore. The Hersch ore is of the same general character as the Brown Monster. The situation of these two mines in relation to each other is such that they should be worked and operated by one company.

MONO COUNTY—BODIE DISTRICT.

Work at the different mines continues as usual, and there is no change to report.

PLUMAS COUNTY—GREENVILLE DISTRICT.

CRESCENT.—The mill is running regularly.

TAYLOR-PLUMAS.—A very marked and most favorable change has lately occurred in the face of the main tunnel; all the way in, the ground had been exceedingly hard and difficult to work, but lately the character suddenly changed; the ground has become soft, and most of it can be worked with the pick. As was to be expected, when softer ground was entered, the ledge-matter widened out; in the hardest ground there were places where the ledge was not much over one foot wide; now it is about five feet wide; this is not all solid ore, but consists partly of stringers, with soft dirt between.

CANADA.

PHOSPHATE MINES.—According to the Montreal *Herald*, the operations in phosphate mines in Ottawa County promise to be carried on extensively during the coming summer. One of the new companies which is preparing to operate is the Union Phosphate Mining and Land Company. This company has purchased the Preston property.

Mr. J. H. Dwyer has sold his phosphate mine in Templeton to an American company for $60,000.

About 8000 tons of high-grade phosphate are at present at the Buckingham station of the Canadian Pacific Railroad, Ottawa; also at the Windsor wharf, awaiting shipment. This quantity was drawn by sleigh from the mine on the Du Lievre during the past winter. Two thousand two hundred tons have been taken within the past six months from Mr. B. W. Murray's mine, and deposited at the station.

MANITOBA.

The Manitoba *Mining Index* says:

ARGYLE.—The machinery is working well; about twelve tons per day are put through. The run, so far, has shown a result of about $40 per ton.

LAKE WINNIPEG.—The shaft is driven as rapidly as it is possible for day and night shifts to push the work. No difficulty is experienced from the flow of water, there being just enough coming in to answer for drilling purposes. About sixty tons of ore have already been taken out.

NOVA SCOTIA—SHERBROKE DISTRICT.

The Pactolus Gold Mining Company, of Nova Scotia, which has recently been working on a belt of low-grade ore yielding about $4 per ton at the 95-foot level, started a cross-cut north, and, at a distance of ten feet from the belt, struck a twenty-inch lode hitherto entirely unknown, and made a rich strike therein. Two tons of the ore gave $1248 gold; $80 was taken out of one pound of ore; $600 was taken out of six pounds; $540 was taken out of nine pounds, besides specimens valued at $200 being retained; making in all $2668 from two tons of ore. This strike has created the greatest excitement not only in this district, but is attracting general attention to Nova Scotia mines. It may be added that on this same property the deepest workings have been attained of any mine in Nova Scotia, a single vein having been worked down to a depth of 800 feet.

COLORADO.

HOOSAC.—The annual meeting of the Hoosac Mining and Milling Company was held at Boston recently, the following directors being elected: George S. Merrill, of Lawrence; Cyrus S. Haldeman, of Boston; Cyrus N. Pratt, of New York; Henry B. Pierce, of Boston; Thomas B. Bryam, of Colorado; V. V. Vanderburg, of Colorado; Alfred S. Potter, of Providence; and George E. Curtis, of New York. The statement of General Manager Vanderburgh for the year ended February 28th showed the following:

DISBURSEMENTS.

Labor	$26,880.84
Expenses	4,508.51
Property	5,094.35
Total	$36,483.70

RECEIPTS.

Drafts	$15,804.86
Sales of ore	18,034.27
Balance on hand last annual report	80.79
Balance due managing director	$2,563.78

The above balance was canceled during the early part of the present month through the sale of ore on hand, amounting to $3080.70. The Little Mattie mine has paid expenses since last July, four men on mineral paying the expenses and labor of 24 men on development. One hundred and thirty-two tons of mineral of all grades, sold to date, have netted $136.63 per ton. In the Little Mattie, there have been completed and substantially timbered 456 feet of levels 6½ by 5 feet, 275 feet of shaft 12 by 8 feet, and 104 feet of stopes—in all, 835 lineal feet. There was expended upon the Hoosac mine the past year $6777.07. The March sales of ore amounted to $4011.37. The output in March averaged over one ton of assorted ore per day.

ARAPAHOE COUNTY.

BOSTON & COLORADO SMELTING-WORKS.—It is reported that the capital of this company is to be increased from $1,000,000 to $2,000,000.

BOULDER COUNTY.

The news from the different mines around Jamestown continues to be favorable. The Nil Desperandum is giving good indications. Work on the White Rock is pushed and good ore is produced. The Buckhorn and the Golden King mines are both shipping ore from which the returns are very satisfactory. The Invincible holds its own, and is visited daily by curious investigators.

CHAFFEE COUNTY.

BRISTOL.—This mine has lately been leased. The vein is a large and well-defined fissure, and shows an eight-foot breast of mineral which mill-runs sixty-three ounces in silver and ten per cent lead. The lessees have begun operations, and are putting the mine in order, and shipping will be commenced next week. It is not settled as yet where the ore will be shipped, but it will probably go to Cañon City.

NILES-AUGUSTA.—Later developments and returns from assays show the strike of iron ore to be of considerable importance. The first specimens, which are inferior to the mineral now in the breast of the workings, returned thirteen and a half ounces in silver and 35·4 per cent iron. Assays were not made for lead, although the iron carries a small percentage of it. This same body has been tapped from the other side, and shows a continuous body over seventy feet in extent. The maximum thickness of the ore is not known, but the entire face of the present drift is in mineral. There is a body of mineral overlying this iron, the extent of which is not known, which carries thirty-four ounces in silver and forty-one per cent in lead.

ONLY CHANCE.—This mine has been shipping on an average from twelve to sixteen tons per day of mineral which averages about thirty ounces in silver and fifty-five per cent lead per ton. A large body of ore has just been opened in the workings, and the connection has been completed to the shaft, which will admit of larger shipments from this time on.

MASCOT.—The mine consists of two tunnels and the discovery-shaft. The tunnels are about 80 or 90 feet in depth. The owners have been confining themselves to development-work, and a great portion of the rich ore still remains untouched.

GILPIN COUNTY.

The new discoveries of silver mines in this county, says a dispatch to the Denver *Tribune*, are proving a surprise to the oldest and best miners. Sears & Morris are getting out some fine-looking silver glance from their new mine just opened up in Silver Gulch, east of Black Hawk. They have an eighteen-inch crevice. The Specie Payment, in Virginia Cañon, has been leased and bonded for $75,000, with a paid-up working capital of $10,000, and will begin operations at once. The Champion lode, in the same cañon, now in the hands of an English company, is shipping two and a half cords per day.

JEFFERSON COUNTY.

MINERS' SMELTING AND REDUCTION COMPANY.—The company is running its works at Golden at their fullest capacity night and day, and will probably have to build a large addition to the already extensive works, in order to treat the large quantity of ore. The company is at present working a force of sixty men.

LAKE COUNTY.

Late Leadville exchanges contain the following:

BRADSHAW TUNNEL.—One of the most extensive pieces of prospecting upon Printer Boy Hill is this tunnel upon the north side in California Gulch. The tunnel has been run in a distance of 720 feet, and the intention is to push it about 200 feet farther, with the object of catching the contact disclosed in the Nellie S. In the Lincoln drift of the tunnel, small streaks of mineral have been discovered which were worked and reduced at the Oro stamp-mill It carried about four ounces in gold and a small amount of silver.

CLIMAX.—The Montana shaft is showing some rich mineral. About thirty-five tons of ore are shipped daily, carrying on an average over 100 ounces of silver per ton.

CLONTARF.—This property has now got its water under control and about 300 gallons are taken out per minute. A drift has been run at the bottom of the shaft which is 24 feet lower than the ore-body which was cut recently. The ore-body varies between eight and ten feet thick, and runs about seventy per cent in lead and from twelve to eighteen ounces in silver. Shipping ore will commence shortly.

LITTLE SLIVER.—The suit of Bradford *et al. against* H. S. Kearney, representing the lessees of the Little Sliver mine, being an application for an injunction to restrain the lessees from taking out any more ore from the mine, has been dismissed by Judge Hallett, on the ground that no valid reasons were shown why such an injunction should be granted. The petition alleged that the lessees had extracted more ore from the mine than had been accounted for, but failed to show even presumptive evidence that such was the case. The applicants for the injunction represent a one-ninth interest in the property.

POCAHONTAS.—Among the properties which are started up by lessees, this mine, adjoining the Weldon, on Carbonate Hill, is not the least promising. An engine is now in place over the shaft, and work has been actively commenced. The shaft is 270 feet deep, and there is about fifty feet of water in it. The lessees will first endeavor to handle the water by the present facilities, and if not successful will run a drift above it. There is now a fine body of iron contact exposed in the bottom of the shaft.

WELDON.—This property is situated between the Pendery and Pocahontas, and the location is regarded as most desirable. For some weeks past, it has been working in an eight-foot breast of iron ore, which ran from thirty to fifty dollars per ton. A strike of rich ore was made recently. The force of miners will be increased at once, and work will be pushed vigorously.

SUMMIT COUNTY.

CHAMPION.—The property is now worked under a lease. The principal workings at present lie about two hundred feet above the Robinson, and the ore which is hoisted will average about 100 ounces of silver and 40 per cent in lead. On the dump may be seen over 75 tons of mineral, which will be shipped for reduction.

ROBINSON.—About thirty tons of ore are shipped daily, which is extracted from the various levels running from the sixth to the twelfth, which, it is said, carries about forty ounces in silver and a small percentage of lead, and which is treated at the Argo works.

DAKOTA.

CHEYENNE.—A dispatch to the New York *Tribune* says that the affairs of this company, which have been in a wretched muddle for years, have been adjusted, and a mill is to be erected as soon as one can be shipped. It is understood that the mill is to be one of eighty stamps. Much development-work should be performed on this property before great expense is incurred in procuring reduction-works.

FATHER DE SMET.—The superintendent's report from April 8th to April 15th shows ore extracted from first, second, and third levels, 2090 tons. Ore milled, 2040 tons. North end tunnel in 869 feet. Golden Gate north header in 76 feet. Cook's west cross-cut in 50 feet. In Cook's west cross-cut, have struck a good body of ore. Will cut out a chamber.

ORO FINO.—A contract has been awarded for the erection of hoisting-works at this mine and putting in many improvements, including a Gates crusher, feeders, pumps, etc., the whole to cost $12,000. It is the intention to have the work completed by July 1st, when the mill will resume operations. In the mean time, no work will be done by the company at the mine.

PHANTOM.—It is reported that negotiations have been concluded with an English syndicate whereby the latter will erect two 120-stamp mills upon this group of mines on Box Elder. This group consists of eight contiguous locations in a district (Greenwood) of which little is known even at this near-by point. The property has been quietly and thoroughly developed by a system of open cuts, shafts, and tunnels, and discloses a large body of crystallized ore showing much free gold and milling far above the average Black Hills production. The success of the Phantom scheme will insure the opening of a large and comparatively unexplored district.

SITTING BULL.—Work is advancing satisfactorily on the enlargement of the mill, and will no doubt be ended by the 1st of May.

GEORGIA.

BARLOW.—The open cut at this mine, says the Dahlonega *Signal*, is the largest one in the district, and, in fact, in the State. It is from 400 to 600 feet wide, and nearly one fifth of a mile long.

CONSOLIDATED GOLD MINING COMPANY OF GEORGIA.—The Ivey mill is running regularly on ore from the Ivey cut. The yield is uniform. The ditch that has been so very troublesome now affords a considerable head, and is expected soon to come up to expectations. The 60-stamp mill will be ready for operation some time during the summer.

SINGLETON.—Twenty-five stamps are now running on ore taken from the large stope on Findley Ridge. The company's water-power twenty-stamp mill is one of the most complete in the district. The canal that conveys the water from Yahoola River to the mill is about 700 feet long.

MAINE.

DOUGLASS.—At a meeting held recently, it was decided to purchase immediately two calcining furnaces similar to those in use at the Orford Nickel and

Copper Company's work at Bergen Point, N. J. The information from the mine is of a cheering nature; the furnaces are working well, the mine is showing up large quantities of ore of an excellent grade, and preparations are making to conduct operations on a large scale with the intention of turning out thirty tons of ingot copper per month.

FANEUIL HALL.—The Hancock *Bulletin* states that the order for the removal of this company's machinery from Sullivan has been countermanded, and a full crew is at work putting things in shape again.

MANHATTAN.—Work has been resumed.

MEXICO.

A dispatch to the New York *Tribune* says that one of the largest sales of Mexican lands ever made has just been made to a London syndicate. The estate sold is known as the Bustamente tract, and comprises a million acres in Zacatecas. The price paid was $2,500,000.

PACHUCA DISTRICT.

A correspondent of the Mexican *Financier* says that the San Ignacio mine continues in rich ore, and really is the only important mining work now doing by the Real del Monte Company. A large amount of paving stone, etc., has been ordered for the Sanchez reduction-works, as a bed for the patio process. The ores will be ground by arrastras, run by animal power, and the poor people of the vicinity are rejoiced at even this additional prospect of work. They earnestly hope that the opening of these new works by the company will not cause them to close some of their other reduction-works; but unless work be soon resumed in the mines, the supply of ore will not be enough to keep all the works running, especially as the company will lose the Santa Gertrudis ores as soon as the latter company completes its reduction-works of Gaudalupe and Progreso. These ores have always paid large profits to the old company which has until now worked them.

The prospects of the Santa Gertrudis continue good, and twice the present amount of ore could be extracted easily. There have been lively times at the recent meetings of the stockholders. A committee has lately been appointed to examine the books, inspect all parts of the mine, make its own assays, and visit the reduction-works regularly.

The Pachuca River Company has erected part of its machinery and buildings, and has begun to transport the tailings for concentration. Much of the machinery has not arrived. The lawsuit between the claimants of the Rosario Viejo mine and some of the chiefs of this company, for the possession of the mine claimed to have been forcibly taken from the above claimants, continues, and promises to be a bitter struggle.

The engine at the Acosta mine of Real del Monte will be removed to the San Pedro mine of Pachuca. La Estrella and Alta Gracia mines have struck a good body of ore. At the Rosario, the water has been lowered 25 feet, and a lode of rich ore has been uncovered.

The work on the reduction-works of San Antonio Huasca is nearly completed, and ores will be treated there very shortly. Work has been resumed on various other mines in the district.

MICHIGAN.

The plumbago deposit developing near Humboldt is improving steadily, and gives much encouragement to the owner. The deposit has been cross-cut a distance of 60 feet, and sunk upon 25 feet. It is at yet slightly siliceous, but shows less of this detrimental mineral as greater depth is attained. The shaft will be continued to a depth of 60 feet.

ROPES.—The work of sinking the Curry shaft has been interfered with during the past week by an abundance of water. A pump will be put in at once. The management is desirous that sinking shall progress as rapidly as possible, so that a large stoping face may be had by the time the mill is ready to treat the rock. About 70 tons of fine quartz are now on the dump. The treatment of several tons of the rock of this mine, made in New York recently, proved that 60 per cent of the gold was saved on the plates alone. Concentrator, riffles, and arrastra will be added to the mill. The location is most advantageous for cheap treatment of the rock; a brook of sufficient size to furnish water flows within a few yards of the mine; there is an abundance of timber growing on the lands of the company; the fall from the site of the mill is fitted by nature; and labor can be procured at one half the cost that Western companies have to pay for it.

MONTANA.

MARYSVILLE DISTRICT.

DRUM LUMMON.—It has been decided to erect a sixty-stamp mill. The old mill, which has been running several years with good results, will be refitted and used to make test runs on the several qualities of ore which may be discovered in the mine, in order to demonstrate the grade of its milling character.

SUMMIT VALLEY DISTRICT.

ALICE.—The latest strike was on the surface of the south vein between the Magna Charta and the Valdemere, about midway between the two shafts. Developments already made across the vein show it to be seven feet wide, and an average assay yields 80 ounces of silver per ton; it has not been assayed for gold. The ore from this important development is extracted and hauled to the mills on wagons In the Alice proper, the strike recently reported in the 100 has now been developed a distance of 270 feet horizontally, the entire distance being in pay-ore. The same vein has been struck in the 200, running east, south of the shaft, where the face of the drift is in pay-ore of the same grade and quality as the pay-chute developed in the 100.

BELL.—The smelter started up April 14th. There is ore on hand for a sixty-day run; and by the time the ore now at the smelter is exhausted, it is expected the mine will be in shape to furnish a future supply. Until that time, but one stack will be run. At the mine, work is progressing favorably in the new three-compartment shaft, which has reached a depth of 188 feet. Softer ground has been struck, and progress will be more rapid in the future. A north drift will be run from the 300 as soon as that depth is reached, which will be connected with the old workings in the 240 west drift, by an uprise. This plan will enable the company to begin hoisting the high-grade copper-silver ore from the old workings, before the supply on the smelter dump is exhausted.

SHONBAR.—The last mill-run averaged $160 net to the ton.

NEVADA.

BERRYMAN TUNNEL AND MINING COMPANY.—Work upon the tunnel was commenced some time ago. An open cut was run a short distance, beginning at a point in the quartzite about 75 feet down the hill below the contact of it and the ore-bearing lime-rock. There is a good wagon-road to within a few feet of the tunnel, and no difficulty will be experienced in getting supplies to it. As was anticipated of the formation, it is peculiarly easy to work.

NYE COUNTY.

A correspondent of the Eureka *Sentinel* says: At Hot Creek, the Philadelphia Company is doing but little beyond assessment-work. The Mountain View Company possessed but little perception, as was proved by its management. It erected the old Lemon mill, formerly of Eureka, near the mine, regardless of the necessity of a bountiful supply of water for milling purposes. The diminutive spring near which it located proved inadequate to the requirements, and, as a result, the works were closed and the men discharged unpaid. It is difficult to determine whether the Mountain View mine is valuable or not. Reports about it conflict greatly. Some contend that it has plenty of good ore in sight, while others assert the contrary.

The Rattlesnake has a promising future before it. It appears to be situated on the same mineral belt as Morey, Hot Creek, and Tybo. The chief mines are the Sedan, Louisa, and Oliver Twist. The Sedan is down over 100 feet, with levels showing a well-defined ledge of good average ore.

If it were not for the fact that eight or ten men are working in the 2 G mine, the Tybo camp would be absolutely and completely defunct. The men above mentioned are taking out considerable fair ore on contracts, and will have sufficient on the dumps to start up the mill before long.

In a mining sense, Belmont is dull, though hopes are entertained of its soon becoming otherwise. The Belmont Company is speaking of starting up the works on an extensive scale shortly. Rich ore was recently encountered in one of the mines, making the prospects brighter than they have been for a long time past. Work is still prosecuted in Spanish belt, 11 miles distant from Belmont, by the Barcelona Company. A long tunnel is driven ahead without delay.

NEW MEXICO.

The Southwest *Sentinel* states that an English syndicate has bought the entire property of the Queen City Company and of the Valverde Mining and Smelting Company and sixty other mines, covering in all nine square miles of mineral land. This sale is one of the most important that has occurred in New Mexico for many months, the actual price paid being $1,500,000 in cash. The English company has reserved $1,000,000 for a working capital to open and develop the mines and to extend and enlarge the reduction-works already erected. The properties transferred are extensive and of great value.

ILLINOIS.—The grading for the company's smelter at Copper City is nearly completed. According to the manager's statements, the company can take out one hundred tons of ore per day from the Eureka mine, and if this smelter which is now erecting works successfully, it will put up four more. The machinery for the smelter has arrived, and it will be in working order in thirty days. Hauling ore to the bins constructed for that purpose will be commenced at once, and by the time the smelter is completed four or five hundred tons will be on the ground.

SAN JOSE.—One furnace of a capacity of thirty tons has been erected by this company, which will be in running order very shortly. The purchase of ore and supplies has already begun.

OREGON.

EASTERN OREGON.—We have the following letter concerning this property, dated April 6th:

The Monumental Gold and Silver Mining Company, now known as the Eastern Oregon, was incorporated in this State, and commenced operating on the Monumental mine in 1876. After developing the mine to the depth of 250 feet, the company erected in 1879 a first-class ten-stamp dry-crushing silver mill, which began reducing ore in December of that year. The mill continued to run at intervals during 1880 and part of the spring of 1881, when it fully closed down, the company having utterly exhausted every available pound of ore in the mine, contracted an indebtedness of sixty-five thousand dollars, which still hangs over it in the shape of a mortgage, and victimized every one who was foolish enough to invest in any of its 500,000 shares. An examination of the mine and of the records of the clerk's office of Grant County will verify the above statements.

F. E. C.

PENNSYLVANIA.

A dispatch says that great excitement prevails at Myerstown, Lebanon County, owing to a supposed discovery of a gold vein. Farmers have given up their business and begun digging on their premises. Kreitzer & Co., of Philadelphia, have equipped a mine with a sixty horse-power engine and a furnace for smelting ore, and are making daily shipments of quartz to Philadelphia. Over $6000 have already been spent in experimenting.

SPAIN.

THARSIS-SULPHUR AND COPPER COMPANY.—This company owns mineral properties in Spain, and in 1878 effected a fusion with the Huelva (French) Copper Company, by which the mines, property, and assets of that company were acquired by the purchase of the capital shares, and the exchange of the Jouissance shares for shares of the Tharsis Company. Of the capital shares, 401 (representing £4185) remained unredeemed on December 31st, 1881, and of the Jouissance shares there were 1116 outstanding. In 1881, a scheme was prepared by the directors by which the capital of the company was to be reduced from £1,236,660, divided into 123,666 shares of £10 each (91,896 fully paid up, 31,100 with £7 paid up, and 670 unissued), to £1,174,460, divided into 117,446 shares of £10 each, such reduction being effected by reducing the liability on each of the 31,100 shares after £1 has been called and paid up thereon to the extent of £2 per share, and exchanging four paid-up shares of £10 each for five shares £8 paid of these 31,100 shares. The capital of the company is then to be increased to £1,250,000, divided into 125,000 shares of £10 each, by the creation of 7554 new shares. These, along with the 670 shares hitherto unissued, are to be sold at the discretion of the directors. The funds realized from the call on the 31,100 shares and from the issue and disposal of the 8224 shares are to be applied in paying of the debenture debt of the company. This scheme was adopted by the shareholders by resolutions passed on November 24th, 1881, and confirmed on December 9th, 1881, but it has not yet been effected. The call of £1 per share on the £7 paid shares has, however, been made for January 2d, 1883, and it is believed that the exchange of these £8 paid shares for fully paid-up £10 shares will take place shortly after. Accounts are now made up annually to December 31st and submitted at Glasgow in April. According to the report and accounts for the 10 months to December 31st, 1881, after the payment of the dividends, writing £20,000 off the mines in Spain, and adding £20,000 to the reserve fund, £32,724 were carried forward. Railroad and pier sinking fund, £100,000; reserve fund, £90,124; reserve for alteration of railroad, £10,000. Dividends for last five years—1877-8, 17½ per cent; 1878-9, 16½ per cent; 1879-80, 20 per cent; 1880-1, 25 per cent; 1881 (10 months), 30 per cent. Of the existing debentures, £66,000 are repayable in one year, £214,000 in two years, £10,000 in three years, and £60,000 in five years.

UTAH.

CACTUS.—The company is working a force of men in drifting and sinking. Two drifts are running on the vein in opposite directions in good ore for concentrating. Concentrating-works are building, which will be capable of handling a vast quantity of ore. The company expects soon to begin shipping the concentrates.

CLYDE.—The mine is developing to a greater extent than any in the Marysvale District, and is showing well. One tunnel has been driven 675 feet, to tap the vein at a depth of 450 feet. This tunnel will soon reach the vein. Another tunnel on the ledge has been driven 175 feet, which tapped an ore-chamber thirty feet long and twenty feet wide. From the inner end of this tunnel, a shaft has been sunk 7 by 7 feet and fifty feet deep, from which between 600 and 700 tons of ore have been taken. This ore assays 75 ounces silver, 25 per cent copper, and about $3 in gold. It carries some iron and silver, and is an easy ore to smelt.

MAMMOTH.—Matters at the Mammoth works, Tintic, says the Salt Lake *Tribune*, remain quiet, and yet preparations are going on for active operations as soon as the management meets its engagements with the men. The smelters are lying idle, so are the mines, but machinery for the reduction-works is getting into place. Twenty-six dynamo machines have been put in position for the purpose of separating copper from the matte and leaving the silver, gold, and other substances to be afterward disposed of by refining. It is understood that Mr. Goodhart, the gentleman coming from England to provide funds, will arrive here early in May, after which all matters will be adjusted and the works put in full operation again.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, April 27.

The mining market has been dull and featureless. Most of the business done at the Mining Exchange has been in Pipe Line Certificates, and mining stocks have been almost neglected. There is nothing new to note, the dealings being confined to the same fancy and low-priced stocks that have monopolized the market for the past month. Below will be found a complete summary. The total number of mining shares sold at all the Exchanges aggregates 326,892, as against 262,326 last week.

The Comstock shares have been strong under small dealings. California was quiet and steady, selling from 20@23@22c. Consolidated Virginia had a small business at firm prices, selling from 44@50@47c. Sierra Nevada was but moderately dealt in, and sold from $1.88, assessment unpaid, to $3.40, assessment paid.

Union Consolidated had a small business and showed a little strength; it sold from $3.25@$3.60. Mexican records a small business and was firm, selling from $2.55@$2.88. Hale & Norcross sold at $4.50@$3, with a small business. Savage was quiet and steady, selling from $1.88@$2.13. Yellow Jacket was dealt in to the extent of 300 shares at $2.75@$3.25. Sutro Tunnel had a small business at steady prices, selling from 20@21c.

The Leadville stocks were quiet and steady. Amie Consolidated sold from $19@$20, with a business of 7300 shares. Chrysolite was quiet and weak; it sold from $1.20@$1. Dunkin sold from 26@20c. under a small business. Hibernia sold at 3c. Iron Silver was quiet and steady, selling from $2.80@$2.90. Leadville sold from 68@69c., the transactions aggregating 600 shares. Little Chief was quiet and steady at 43@47c. Little Pittsburg was moderately dealt in at weak prices; it sold from 70@50c. Big Pittsburg has also been weak, under a fair business, and has sold from 16@10c. Climax was quiet and steady at 5@7c.

The Bodie stocks were quiet and steady. Bodie Consolidated sold from $1.25@$1.30, with a business of 350 shares. Standard was very quiet at steady prices, selling at $6.75@$7. Bulwer had a small business and was steady, selling from 80@85c. Goodshaw sold at 2c.

The Tuscarora stocks were quiet and very irregular. Grand Prize showed considerable strength at one time, but lost some of it toward the close; it sold from 80c.@$1.15@95c. Argenta sold at $1.40 to-day. Belle Isle was quiet and steady, selling from 56@50c. Navajo had a small business, and was very irregular; it sold from $2.50@$3.50 and then down to $2.25, closing at $2.30 to-day. North Belle Isle was quiet and steady at 38@35c. Independence records a fair business at irregular prices; it sold from 55@68@62c. Elk Consolidated was active and irregular, selling from 8@5@6c., the business aggregating 16,200 shares.

In the miscellaneous list, Alice sold from $3.25@3 under a fair business. The Green Mountain stocks have been very quiet at steady prices. Gold Stripe sold from 9@8c. Green Mountain sold from 85@80c. Rising Sun was quoted at 3c., and Cherokee at 2c. Hall-Anderson records a fair business, and was very irregular during the week, but developed some strength to-day; it sold from $1.40@$1.20@1.45. Horn-Silver was quiet and irregular, selling from $7.25@$8.@$7.50. Hukill sold from 12@10c., the dealings being small. Northern Belle was quiet and firm, selling from $8.38@$9.@$8.75. Robinson Consolidated continues to be actively dealt in at very irregular prices; it sold this week from 86@79c., closing to-day at the latter figure. Sierra Grande was quiet and strong, selling from $1.65@$1.85. Silver King sold at $10.38@$10.50.

Alta-Montana records an active business at irregular prices, selling from 5@3@4c. Bradshaw was quiet and steady at 28@29c. Central Arizona, with one transaction, sold at 31c. Dahlonega was quiet and steady, selling from 4@3c. Decatur was very active and very irregular; it sold from 5@2@3c. Durango was also irregular under a small business, and sold from 8@4@8c. Eastern Oregon sold from 25@19c., with small dealings. Harlem had a small business and was steady, selling from $1.40@$1.50. Hortense sold at 12c., and Lacrose from 13@11c. Oriental & Miller was quiet and steady at 14@16@15c. Rappahannock sold from 8@7c., with a business of 6800 shares. Silver Cliff was fairly dealt in at weak prices; it sold from 23@16@19c. Sonora Consolidated records a very large business, and has gradually declined from its strong prices of last week; it sold from $1.05@84@86c. South Hite sold at 18c. under a small business. South Pacific was quiet and steady at 6@5c. The State Line stocks were active at steady prices; Nos. 1 & 4 sold at 2c., and Nos. 2 & 3 from 5@4c. Taylor-Plumas sold from 17@16c., with a business of 5600 shares.

Judge Barrett has granted an order requiring all persons interested in the Battle Creek Gravel Mining Company to show cause, July 30th, why the company should not be dissolved. The company owns property in Custer County, Dakota, has a debt of nearly $15,000, and can not work the mines with profit.

DIVIDENDS.

The Calumet & Hecla Mining Company, of Michigan, has declared its quarterly dividend of $500,000.

The Jackson Mining Company has declared a dividend (No. 1) of ten cents per share.

The Total Wreck Mining Company, of Arizona, has declared a dividend (No. 1) of twenty-five cents per share, or $50,000, payable May 15th.

DIVIDENDS PAID BY MINING COMPANIES DURING THE MONTH OF MARCH, AND FROM JANUARY 1ST, 1883.

NAME OF COMPANY.	Location of mines.	Paid during month of April.	Since January 1, 1883.
Atlantic, C.	Mich.		$80,000
Bassick, S.	Colo.	$100,000	100,000
Boston & Montana, G.	Mont.		10,000
Bulwer Consolidated, G.	Cal.	5,000	20,000
Calumet & Hecla, C.	Mich.		500,000
Carbonate Hill, S.	Colo.	10,000	30,000
Castle Creek, G.	Idaho.	3,000	12,000
Central, C.	Mich.		60,000
Christy, S. L.	Utah.		6,000
Contention, S.	Ariz.	62,500	250,000
Con. Gold M. Co. of Ga.	Ga.	4,000	16,000
Copper Queen, C.	Ariz.	125,000	250,000
Cosmopolitan.	Utah.		50,000
Deadwood-Terra, G.	Dak.		20,000
Father de Smet, G.	"	20,000	60,000
Gem, S.	Colo.		5,000
Glen, S.	"		2,000
Granite, S.	"		2,500
Hecla, S.	Mont.	15,000	60,000
Holyoke, G.	Idaho.	4,000	16,000
Homestake, G.	Dak.	50,000	200,000
Hope, S. C. L.	Mont.		12,000
Horn-Silver, S. L.	Utah.		300,000
Idaho, G.	Cal.	7,750	31,000
Indian Spring Drift.	"		1,000
Iron-Silver, S. L.	Colo.		100,000
Jocuistita, S.	Mexico		50,000
Kentuck, S.	Nev.	3,000	12,000
Leadville Consolidated, S.	Colo.		20,000
Navajo, G. S.	Nev.	25,000	100,000
Northern Belle, S.	"	25,000	100,000
Ontario, S. L.	Utah.		75,000
Osceola Consolidated, C.	Mich.		50,000
Oxford, G.	N. S.	5,000	10,000
Prussian, S. L.	Colo.		15,000
Quincy, C.	Mich.		240,000
Richmond, S. L.	Nev.		135,000
San Francisco, C.	Cal.		2,500
Shoshone, G.	Idaho.	1,500	6,000
Sierra Grande, S.	New Mex.	100,000	400,000
Silver King, S.	Ariz.	25,000	100,000
Smuggler, S.	Colo.		9,000
Standard Cons., G.	Cal.	25,000	100,000
True Fissure, G. S. L.	Utah.	37,500	37,500
		$653,250	$3,655,000

G., gold. S., silver. C., copper. L., lead. N., nickel. Q., quicksilver.

MEETINGS.

Chase Gold and Silver Mining Company, No. 206 Broadway, Room 22, New York City. A deferred meeting of the stockholders, May 5th, at four o'clock P.M.

Conglomerate Mining Company, No. 205 Walnut place, Philadelphia, Pa. A special meeting of stockholders for the purpose of confirming the sale of certain lands to the Mendota Mining Company, May 3d, at twelve o'clock M.

Hanover Mining Company, No. 70 Devonshire street, Boston, Mass. Annual meeting of stockholders and election of trustees, May 8th, at three o'clock P.M.

Harshaw Mining Company, No. 62 Cedar street, New York City. A special meeting of stockholders for the purpose of deciding whether the company shall be wound up or not, May 15th, at twelve o'clock M.

Hibernia Silver Mining Company, No. 61 Broadway, Room 29, New York City. Annual meeting of stockholders and election of trustees, May 7th, at twelve o'clock M.

Hukill Gold and Silver Mining Company, No. 35 Broadway, Room 88, New York City. Special stockholders' meeting for the purpose of taking final action on a plan to save the company's valuable property from creditors, May 10th, at one o'clock P.M.

Silver Cord Combination Mining Company, company's office, on Iron Hill, near Leadville, Colorado. Annual meeting of stockholders and election of trustees, May 15th, at eleven o'clock A.M.

PIPE LINE CERTIFICATES.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
April 21	$0.94⅝	$0.94¾	$0.94⅛	$0.94⅛	210,000
23	.94½	.94¾	.92½	.92¾	2,291,000
24	.93⅛	.93½	.92½	.93⅛	1,546,000
25	.93¼	.93⅞	.90	.90¼	4,550,000
26	.89⅛	.90¼	.86	.86	2,585,000
27	.86	.89⅜	.85	.88¼	3,966,000
Total sales.					15,148,000

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market has been more active than usual this week, and prices have been firm. Most of the business done was in the Comstock shares, Hale & Norcross being the most prominently dealt in at strong prices. The middle Comstocks were also quite active and were steady. The Tuscarora stocks were generally quiet and steady, with the exception of Grand Prize, which was quite active and very strong.

The following are the financial balances of the various mining companies on April 1st, so far as reported:

CASH ON HAND.

Alta	$18,764.08
Albion Consolidated	801.99
Benton Consolidated	5,478.75
Best & Belcher	12,691.09
Bodie Consolidated	11,193.84
Bechtel	2,820.24
Bulwer	11,269.04
Belcher	10,560.28
Crown Point	20,561.63
Choliar	3,535.40
Consolidated Virginia	61,424.34
California	2,066.46
Consolidated Imperial	344.76
Challenge Consolidated	234.23
Gould & Curry	32,484.39
Hale & Norcross	43,371.39
Jackson	794.75
Mexican	55,768.10
Manhattan	
Northern Belle	83,560.64
Ophir	31,715.13
Occidental	6,731.09
Mono	4,310.35
Silver Hill	3,500.44
Standard	121,444.98
Sierra Nevada	304.10
Savage	46,486.42
Union	29,953.44
Utah	7,082.81

INDEBTEDNESS.

Lady Washington	$852.49
Martin White	4,029.46
Potosi	7,121.57

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, April 26.

There is but little to be said about the market for mining stocks the past week. The tendency continues to lower prices, and even the dividend-paying copper mines continue to decline, with no immediate prospect of being better. Calumet & Hecla shows a falling off of $2, with sales at $231, and the stock is offered at that price, with but few takers. Franklin is a fraction higher; sales of small lots at $10¾@$10¼, against $10¼ last week. Pewabic sold at $4, assessment ($1) paid. Quincy declined from $46@$44, which is, however, bid for it. Osceola dull at $24@$23½ for small lots. Huron sold at $1½, assessment ($1) paid. Nothing doing in the rest of the list.

In silver stocks, Bonanza declined to $1⅝. Catalpa and Crescent dull at 67½@62½c. for the former and 25c. for the latter. Silver Islet advanced on sale of 50 shares from $2½@$3. San Pedro declined to 60c. Sullivan advanced from $1⅛@1$\frac{5}{16}$, with later sales at $1, closing at $1⅛.

At the Boston Mining Exchange, there is but little business doing, and what business there is, is mostly confined to a few stocks at low prices. Empire is firmer, and has advanced from 18@22c., which was bid for it to-day without calling out the stock. Bowman Silver Company declined to 3c. per share, or 13c., with 10c. assessment paid. This is undoubtedly a good property, and, if well managed, might be made valuable. The course which has been pursued since putting it on the Board has not tended to inspire confidence in its management. Massachusetts & New Mexico is firm at 9@10c., but little doing in it.

3 P.M.—At the afternoon Board, there was no im-

provement. Calumet & Hecla sold at $231. Catalpa at 62½c. Bonanza, $1⅜. Pewabic, $4. Silver Islet, $3. Sullivan, $1⅛. San Pedro, 57½c. Franklin, $10 bid, $10⅝ asked. Quincy, $44 bid, $45 asked. Calumet & Hecla, $230 bid. Allouez, $1⅛ bid. Catalpa, 62½c. bid. Huron, $1¼ bid. National, $1¼ bid. Osceola, $23 bid, $23½ asked.

BULLION MARKET.

NEW YORK, Friday Evening, April 27.

The market abroad and here continues about the same as last week, with a probability of lower prices.

DATE.	London	N. Y.	DATE.	London	N. Y.
	Pence.	Cents.		Pence.	Cents.
April 21...	50½	109⅞	April 25....	50 7-16	*
23...	50½	109⅞	26....	50 7-16	109¾
24...	50 7-16	109⅝	27....	50 7-16	109¾

* 109⅝@109¾.

BULLION PRODUCTION FOR 1883.

MINES.	States.	Month of March.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont..	86,386	$234,193
*Alta-Montana, G. L. S.	"	....	$10,625
*Belmont	"	....	12,604
Bodie, G. S.	Cal....	21,459	66,257
Bodie Tunnel, G.	"	12,747	34,940
*Bonanza King, G.	"	28,945	142,077
*Boston & Montana, G.	Mont...	18,641	53,577
*Central Arizona, S.	Ariz..	20,218	35,845
*Christy, S.	Utah...	22,567	68,405
*Chrysolite, S. L.	Colo...	36,284	118,092
*Contention, S.	Ariz...	85,713	284,259
Crescent, G.	Cal....	....	13,000
*Custer, G. S.	Idaho..	....	43,572
*Deadwood-Terra, G.	Dak...	....	84,556
*Derbec Blue Gravel, G. S.	Cal....	5,201	21,803
*Father de Smet, G.	Dak....	32,200	101,389
*Frisco M. and S. Co., G. S. L.	Utah...	§16,795	60,718
*Head Center and Tranquillity	Ariz..	4,593	4,593
*Hecla Cons., G. S.	Mont...	59,000	177,924
*Homestake, G.	Dak....	....	211,348
*Hope, S.	Mont...	....	20,574
Horn-Silver, S. L.	Utah...	285,000	764,000
*Independence, G. S.	Nev....	18,971	26,943
*Kentuck, G. S.	"	1,875	6,137
*Lexington, S.	Mont...	117,343	309,708
*Little Pittsburg, S. L.	Colo...	7,702	19,577
*Marguerite, G.	Cal....	7,300	33,200
*Martin White, G. S.	Nev....	50,030	116,317
*Moulton, G. S.	Mont...	34,700	123,288
Mount Diablo	Nev....	9,857	9,857
*Navajo, G. S.	"	68,833	211,980
Northern Belle, S.	"	46,225	267,315
*Ontario, S. L.	Utah...	....	364,067
*Oxford, G.	N. S....	6,620	15,143
*Pinal Cons., S. L.	Ariz...	....	§49,810
*Satemo, G.	N. S....	....	2,500
*Silver Bow, G. S.	Mont...	....	34,246
Standard, G.	Cal....	74,727	263,006
Star, S.	Nev....	....	27,095
*Stormont, S.	Utah...	19,770	54,604
Syndicate, G.	Cal....	....	9,217
Tintic M. and M. Co.	Utah...	....	7,632
*Tip Top, S.	Ariz....	....	122,983
*Tombstone, G. S.	"	....	123,452
Yellow Jacket, S.	Nev....	69,797	98,753
Total amount of shipments to date			$4,781,089

* Official. † Net value. ‡ Assay value. §Not including value of lead. *G. Gold. S. Silver. L. Lead.*

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended April 27th, as compiled from various sources, amounted to $286,000, as against $191,000 reported for the previous week. The receipts from January 1st, 1883, to date are $4,549,713.53.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended April 21st	$186,970
Corresponding week last year	169,100
Since January 1st, 1883	4,974,087
Corresponding period last year	14,669,353

Imports.

Week ended April 21st	$49,186
Corresponding week last year	32,000
Since January 1st, 1883	6,445,122
Corresponding period last year	1,148,957

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 3 per cent. During the week, the bank lost £73,000 bullion, and the proportion of its reserve to its liabilities was raised from 37 7-16 to 38 3-16 per cent, against 44 3-16 per cent at the same date last year. April 26th, the bank lost £28,000 bullion on balance. The weekly statement of the Bank of France shows gains of 3,020,000 francs gold and 425,000 francs silver. The Imperial Bank of Germany reports a specie gain for the week of 8,580,000 marks.

METALS.

NEW YORK, Friday Evening, April 27.

Copper.—The disappearance of cheap lots has somewhat strengthened the copper market. Sales of Lake are limited to small lots, at the range of 15⅞@16c. We have been unable to verify a rumor that manufacturers had contracted for any considerable lots. We hear, however, that a round lot of Arizona black copper, reported to be 500 tons, has been sold for export, thus showing that producers are in earnest about preventing any serious over-supply. On the other hand, we hear that another concern in Globe, A. T., has stopped, it is said for good. Other brands of copper than Lake are held at 14⅞@15⅝c. England has shown a further decline, having reached to £62 5s. at one time. It has, however, reacted to £62 15s., Chili Bars.

Under date of April 12th, Messrs. French & Smith, of London and Liverpool, quote ores 12@13s. per unit.

British copper statistics have a renewed interest to producers in this country. The following are the Board of Trade returns for the first quarter:

	Jan. 1 to March 31.		
	1883.	1882.	1881.
Imports.	Tons.	Tons.	Tons.
Pure in pyrites	4,348	4,319	3,423
Precipitate	5,414	4,686	5,905
Ore	2,750	2,968	2,234
Regulus	2,012	1,819	674
Bars, cakes, etc.	9,097	8,566	7,170
	23,621	22,358	19,406
Exports.			
Pure in English raw, sheets, yellow metal, and brass	12,296	8,980	10,703
Foreign	2,209	3,235	2,048
	14,505	12,215	12,751

Tin.—This market has been steady, foreign advices, notably from Scotland, showing a firm feeling. There has, however, been no activity here, and the market closes with Straits, spot 21¼c. London closes at £96 10@£96 15s.

Lead.—The market has been exceptionally quiet, the only transaction worth recording being the sale of 250 out of the 500 tons of Germania on the dock here, at 4·60c., the bulk to a holder of lead. In this market, no lead can be bought under 4·60c.; but on the other hand, it would be difficult to place any large quantity at that figure. The rest of the Germania load has gone into store. Only a few hundred tons more are now on their way. Refined is entirely nominal.

The rate of freight on pig-lead from East St. Louis to New York is reduced from 40½ cents to 35 cents per 100 pounds.

Messrs. John Wahl & Co. write to us as follows to-day:

Our market is unchanged. Sales for the week sum up to over 450 tons of Refined at 4·25c. Hard lead is nominally 4·20c. The receipts are 550 tons, against 750 tons last week.

Spelter.—Business is quiet. Sales have been made at 4·80c., which we quote.

Antimony.—We quote 9½@10c. for Hallett's, and 10½@11c. for Cookson's.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, April 27.

American Pig.—It can not be said that buying has been stimulated much by the reduction in quotations in Foundry irons, which has now been generally accepted by the leading producers, though neither Coalbrookdale nor any other is reported as refusing to meet the market, or rather to go sufficiently below it to move red-short iron. We hear of transactions footing up from 2000 to 3000 tons. The situation is now more clearly defined, though it remains to be seen to what extent some of the producers will yield to the pressure and blow out. The first movement will probably be that those furnace-men who are not fortunate enough to draw their supplies of ores from their own mines will try to obtain concessions on iron ore and fuel. It is probable that they will at least partially succeed. This is the element which must decide whether the hopes of buyers who look for still lower prices will be disappointed or not. Forge irons have been somewhat affected, although it must be noted that this grade has been largely sold ahead. We quote $21.50@$22.50 for ordinary to choice No. 1 Foundry; $19.50@$20.50 for No. 2; and $18.50@$19.50 for Gray Forge. Bessemer pig is quiet, with $21@$21.50 the quotation for American at furnace. Foreign is nominal, but it should be noted that English quotations are weakening. Spiegeleisen is steady for the higher grade, $32 being asked, but dull for 12 to 15 per cent metal.

Scotch Pig.—The drop in American foundry iron has placed Scotch pig at a disadvantage. While it previously ranged below the equivalent grades, it is now higher. We quote Coltness at $24.25@$24.50 for early delivery; Glengarnock, $22 asked; Eglinton, $21@$21.50; and Summerlee, $24.25@$24.50. At the Wall Street Exchange, the following cables were received to-day, showing a further slight decline in the patent brands, which were relatively too high. Carnbroe, 54s. 6d.; Gartsherrie, 60s.; Summerlee 60s. 6d.; Coltness, 62s. 6d.; Langloan, 63s. 6d.; Glengarnock, 54s. 3d., and Eglinton, 48s. 3d. Warrants are 47s., and freights unchanged at 5s.

Rails.—During the week, there have been sales, aggregating 9000 to 10,000 tons, in small lots, which are at present the only quantities that can be placed for summer delivery, at about $38 at mill, which we quote, $39@$39.50 being asked for tidewater delivery. England is unchanged at £4 15s.@£5, ordinary sections.

Old Rails.—Business is quiet, the last sales of T's having been made at $23.50, which we quote. Double-Heads are scarce, and are quoted nominally $27.50@$28, at tide-water.

Scrap.—Scrap is lifeless. We quote ex ship nominally $25.

Philadelphia. April 26.

Pig-Iron.—The heavy drop in Foundry iron has not brought out buyers in the force that was looked for. Several of the strong companies have recognized the wisdom of the action of the Thomas Iron Company, and have promptly reduced quotations to $22 for No. 1 and $20 for No. 2. The purpose of this action is to restrict production to the market requirements. There are more furnaces in blast than demand requires, and the strong companies recognize that, sooner or later, restriction will be forced upon them, and they have concluded that it is better to arrest production now, when stocks are comparatively light, and when prices with a little wisdom can be maintained, rather than to wait until stocks have accumulated, and when a recovery by restriction would be impossible, or at least a very slow process. Some of the special brands are selling above $22 and as low as have been heard of are $23. But there is a general downward tendency, and it is said on the street that seven or eight furnaces will blow out in two weeks. A blowing-out will become necessary sooner or later, as, at current rates, a good many furnaces can not make iron. The founders are purchasing from hand to mouth, and look for still lower prices. A few large sales of No. 1 Foundry have been made at $21.75, and like concessions have been made on No. 2. Gray Forge iron has suffered correspondingly, and transactions have been heard of under $18 at furnace, for a fair iron; but the standard brands are still held at $18@$19. A few special brands are held above this figure. Bessemer iron can be sold at $21@$21.50, but quotations are kept at $22@$23, and in consequence only a moderate business is reported, although negotiations are still hanging fire for large lots. The movements in foreign iron are of very little importance. Small sales are made daily for current requirements. A few inquiries are in hand for Middlesborough, but, with a downward tendency in American irons, there is very little chance for it.

Muck Bars.—Our best Muck Bars are selling at $36 at mill, but the ordinary stuff is selling at $34.50@$35. Three or four lots of Charcoal Blooms were closed out at $64. Inquiries have been made for Anthracite Blooms, and sales are reported at $54@$56.

Merchant Iron.—Business in merchant iron is of an unsatisfactory character, and consumers are waiting for further downward tendency in crude material before placing large orders. Another occasion for delay is the uncertainty attending the settlement of the labor question in the West. The trade recognizes that restriction in some shape or other will soon be forced upon it, and it desires to see what action the manufacturers in the West will take. Small retail lots are moving from store at 2·25@2·30c. Large lots have been sold at 2·15@2·20c. It has been said that iron has sold as low as 2·10c., but not for first-class. Orders for Car iron have been placed at 1·90c., and when not cut to lengths, at a tenth less. Skelp iron is weak, and negotiations are in hand, but inside figures can not be given yet.

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	April 21.		April 23.		April 24.		April 25.		April 26.		April 27.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon	3.20	3.00	3.25	.....	3.25	.....	3.25	3.20	3.25	.....	3.20	3.00	3,300
Amie Con., Co	.20	.19	.19	.....	.....	.....	.20	.19	.20	.19	.20	.....	7,300
Argenta, Ne	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.40	.....	600
Bar. & Walker, Ut	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Bassick, Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belle Isle, Ne	.....	.....	.....	.....	.56	.54	.....	.....	.50	.....	.....	.....	300
Bodie Cons., Ca	1.25	.....	.....	.....	1.25	.....	.....	.....	1.30	.....	.....	.....	350
Breece, Co	.25	.....	.....	.....	.20	.....	.20	.....	.....	.....	.....	.....	500
Bulwer, Ca	.85	.80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	400
California, Ne	.21	.20	.....	.....	.23	.....	.....	.....	.22	.20	.23	.22	2,235
Cal. & Hecla, Mich	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carbonate Hill	1.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Caribou Con., Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chrysolite, Co	1.20	.....	.....	.....	1.10	.....	.....	.....	1.10	.....	1.15	1.00	1,300
Cons. Va., Ne	.45	.44	.....	.....	.45	.....	.....	.....	.50	.47	.47	.....	5,100
Crown Point	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Deadwood-Terra, Dk	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin, Co	.22	.....	.....	.....	.26	.....	.20	.....	.....	.....	.....	.....	267
Eureka Cons., Ne	5 63	.....	.....	.....	.....	.....	5.63	.....	5.75	.....	5.25	.....	65
Excelsior, Ca	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Father de Smet, Dk	.....	.....	.....	.....	.....	.....	4.20	.....	4 50	.....	.....	.....	200
Findley, Ga	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Stripe, Ca	.09	.08	.09	.08	.09	.08	.....	.....	.....	.....	.08	.....	3,300
Gould & Curry, Ne	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grand Prize, Ne	.....	.....	.85	.80	1.10	1.00	1.15	1.05	.95	.....	.....	.....	1,000
Great Eastern, Dk	.02	.....	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000
Green Mountain, Ca	.82	.81	.....	.....	.....	.....	.85	.82	85	.80	.....	.....	2,400
Hale & Norcross, Ne	.....	.....	.....	.....	4.50	.....	.....	.....	.....	.....	3 00	.....	400
Hall-Anderson, N. S	1.40	1.25	1.25	1.20	.....	.....	1 35	1.30	1 40	1.35	1 45	1.35	9,100
Hibernia, Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Homestake, Dk	14.88	.....	.....	.....	15.50	.....	.....	.....	.....	.....	.....	.....	115
Horn-Silver, Ut	7.50	7.25	8.00	7.75	7.63	.....	7.50	.....	7.50	.....	.....	.....	715
Hukill, Co	.12	.....	.....	.....	.....	.....	.....	.....	.10	.....	.10	.....	1,300
Independence, Ne	.55	.....	.55	.....	.68	.....	.65	.....	.60	.....	.62	.60	7,150
Iron Silver, Co	2.90	2.80	.....	.....	2.90	.....	2.90	2.85	.....	.....	.....	.....	875
La Plata, Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leadville C., Co	.03	.....	.....	.....	.....	.....	.....	.....	.09	.....	.....	.....	600
Little Chief, Co	.45	.44	.41	.....	.....	.....	.43	.....	.45	.....	.47	.....	1,000
Little Pittsburg, Co	.61	.60	.70	.....	.....	.....	.58	.50	.....	.....	.....	.....	1,045
Martin White, Ne	.....	.....	.....	.....	.....	.....	.....	.....	.45	.....	.....	.....	100
Moose, Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Navajo, Ne	2.50	.....	2.65	.....	3.25	.....	3 50	3.35	2.75	.....	2.50	2 25	2,095
Northern Belle, Ne	8 38	.....	8 50	.....	.....	.....	9.00	.....	.....	.....	8.75	.....	210
North Belle Isle, Ne	.....	.....	.....	.....	.38	.35	.....	.....	.....	.....	.....	.....	400
Ontario, Ut	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ophir, Ne	2.00	1.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Plumas, Ca	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Prussian, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quicksilver Pref., Ca	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., Ca	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rising Sun, Ca	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Robinson Cons., Co	.85	.82	.86	.83	.86	.85	.85	.84	.82	.80	.80	.79	22,900
Savage, Ne	1.88	.....	.....	.....	.....	.....	.....	.....	2.13	.....	.....	.....	200
Sierra Grande, N. M	1.75	1.70	1 65	.....	1.75	.....	1.75	.....	.....	.....	1.85	1.75	2,500
Sierra Nevada, Ne	2.00	1.88	2.50	.....	.....	.....	3.25	.....	3.40	.....	.....	.....	1,005
Silver King, Ar	.....	.....	.....	.....	10.38	.....	.....	.....	.....	.....	10.50	.....	250
Spring Valley, Ca	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard, Ca	.....	.....	.....	.....	7.00	6.75	.....	.....	7.00	.....	.....	.....	80
Stormont, Ut	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tip Top, Ar	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tombstone, Ar	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vizina, Ar	.80	.....	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 0
Yellow Jacket	2.75	.....	.....	.....	.....	.....	.....	.....	3 25	3.13	.....	.....	300
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	April 21.		April 23.		April 24.		April 25.		April 26.		April 27.		
	H	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Advance	.....	.....	.....	.....	.19	.18	.20	.18	.20	.19	.20	.....	1,300
Alta-Montana, G	.05	.03	.04	.....	.03	.....	.....	.....	.....	.....	.....	.....	.....
Am. Flag, s	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.04	.....	18,000
Barcelona, G	.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
Bear Creek	.....	.....	.24	.....	25	.....	.25	.....	.....	.....	.....	.....	1,100
Bechtel Con., G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & B'icher, G. s	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.25	.....	20
Big Pittsburg, s. L	.16	.15	.....	.....	.14	.13	.12	.....	.12	.....	.12	.10	4,400
Bondholder	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Bradshaw, s	.28	.....	.28	.....	.28	.....	.....	.....	.....	.....	.29	.....	1,800
Buckeye	.02	.....	.....	.....	.....	.....	.02	.....	.....	.....	.....	.....	600
" pref	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bull-Domingo, s.L	.07	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10
Bye and Bye	.02	.....	.....	.....	.....	.....	.....	.....	.02	.01	.....	.....	2,100
Calaveras, G	.01	.....	.....	.....	.....	.....	.01	.....	.....	.....	.....	.....	100
C'lav'r's W.&M.Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal., B. H., G	.....	.....	.....	.....	.....	.....	.....	.....	.60	.....	.60	.....	400
Central Ariz'na, s	.31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Cherokee, G	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Climax, Co	.07	.06	.06	.....	.07	.....	.07	.05	.07	.....	.....	.....	2,750
Cons. Imp'ri'l, G.s.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crowell, G	.06	.....	.....	.....	.....	.....	.04	.....	.....	.....	.....	.....	1,500
Dahlonega, G	.....	.....	.04	.....	.04	.....	.....	.....	.03	.....	.03	.....	7,300
Decatur	.05	.04	.04	.03	.03	.02	.03	.02	.04	.02	.04	.03	40,200
Dunderberg	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Durango, G	.08	.....	.....	.....	.....	.....	.06	.04	.06	.....	.08	.....	1,800
Eastern Oregon	.....	.....	.25	.....	.....	.....	.19	.....	.....	.....	.....	.....	200
Elko Cons	.08	.07	.08	.07	.....	.....	.06	.....	.05	.....	.07	.05	16,200
Enterprise	.29	.20	.....	.....	.28	.26	.27	.26	.27	.23	.25	.....	13,100
Fannie Barret	2.25	2.20	2.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	600
Globe Copper	.....	.....	.....	.....	.07	.....	.08	.07	.....	.....	.....	.....	600
Gold Placer, G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Goodshaw, G	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Granville, G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hariem M.& M.Co.	1.45	1.40	1.45	.....	1 50	1.45	1.45	.....	.....	.....	1.50	1.45	5,100
Hortense, s	.12	.....	.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	400
Lacrosse, G	.13	.12	.13	.....	.12	.....	.11	.....	.....	.....	.....	.....	2,400
Lucerne, G	.01	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Mariposa Pref., G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mexican, G. s	.....	.....	2.50	.....	.....	.....	.....	.....	2.88	2.63	2 88	.....	760
Miner Boy	.01	.....	.....	.....	.01	.....	.01	.....	.....	.....	.....	.....	500
Mono	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Standard, G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Horn-Silv'r, s.L	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ori'nt'l & Miller, s.	.16	.14	.15	.....	.15	.14	.16	.....	.15	.....	.....	.....	2,000
Quartz Creek	.03	.02	.02	.....	.02	.....	.03	.02	.....	.....	.....	.....	5,500
Rappahannock, G	.08	.....	.08	.....	.08	.07	.08	.....	.07	.....	.....	.....	9 800
Red Elephant, s	.08	.07	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,800
Ruby, of Arizona	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Cliff, s	.23	.....	.18	.16	.....	.....	.23	.18	.22	18	.19	.....	7,600
Sonora Con	1.05	.99	1.00	.99	.97	.95	.91	.89	.89	.85	.86	.84	30,300
South Bodie, G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bulwer, G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Hite	.....	.....	.....	.....	.18	.....	.....	.....	.....	.....	.18	.....	1,200
South Pacific	.06	.....	.....	.....	.06	.05	.05	.....	.06	.05	.05	.....	8,600
State Line, 1 & 4, s	.02	.....	.02	.....	.02	.....	.02	.....	.....	.....	.....	.....	900
" Nos. 2 & 3, s	.05	.04	.04	.....	.04	.....	.....	.....	.04	.....	.....	.....	35,800
Sutro Tunnel	.20	.....	.20	.....	.21	.....	.21	.20	.21	.20	.21	.20	7,900
Taylor Plumas	.....	.....	.....	.....	.....	.....	.17	.16	.17	.16	.17	.16	5,800
Umadilla, s	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000
Union Cons., G. s.	3.25	.....	3.25	.....	.....	.....	.....	.....	.....	.....	3.60	.....	405
Vandewater	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington	.08	.....	.....	.....	.....	.....	.07	.....	.....	.....	.07	06	2,000
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Full tables, giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 83,957. Non di vidend shares sold, 242,935.

BOSTON MINING STOCKS.

	April 20.		April 21.		April 23.		April 24.		April 25.		April 26.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Amie	.....	.....	.....	.....	.....	.....	.19	.....	.....	.....	.....	.....	500
Atlantic	.....	.....	10.50	.....	10.50	.....	.....	.....	.....	.....	.....	.....	35
Aztec	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bodie Con	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bonanza D	.....	.....	2.13	2.00	1.88	.....	1.87½	1.75	1.63	.....	1.75	.....	975
Bowman Sil	.09	.08	.09	.08	.08	.07	.07	.05	.15	.14	.14	.....	9,840
Bruns. Ant	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bulwer	.....	.....	.....	.....	.80	.....	.....	.....	.....	.....	.....	.....	100
California	.....	.....	.....	.....	.....	.....	.....	.....	.23	.....	.....	.....	300
Cal. & Hec	233	.....	.....	.....	233	.....	.....	.....	232	.....	231	.....	79
Catalpa	.67½	.....	.....	.....	.65	.62½	.65	.62½	.62½	.....	.65	.62½	2,400
Central Ariz	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cherryfield	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Co. Virginia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Copper F'lls	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Copperop	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crescent	.....	.....	.....	.....	.23	.....	.....	.....	.25	.....	.....	.....	900
Cumberl'd	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Decatur	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Deer Isle	.....	.....	.....	.....	.06	.....	.....	.....	.....	.....	.....	.....	1,500
Denver City	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas	.80	.....	.....	.....	.....	.....	.80	.....	.....	.....	.....	.....	200
Duncan	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,600
Empire	.19	.....	.19	.....	.19	.18	.20	.....	.22	.21	.....	.....	2,800
Eureka Con	5.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	5.50	.....	35
Franklin	10.75	10.50	.....	.....	10.75	.....	10.63	.....	.....	.....	9.13	.....	155
Hancock G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Harshaw	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huron	.....	.....	.62½	.....	.....	.....	1.50	.....	.....	.....	.....	.....	125
Independ'ce	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Indian Q'n	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mammoth	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mass.& N.M.	.09	.....	.09	.....	.....	.....	.09	.....	.09	.....	.10	.....	11,100
Milton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Napa	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
National	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North. Belle	.....	.....	.....	.....	.....	.....	8.63	.....	.....	.....	9.13	.....	60
Ontario	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Osceola	.....	.....	.....	.....	.....	.....	.....	.....	24.00	.....	23.50	.....	42
Penn-Breck	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pewable	.....	.....	.....	.....	.....	.....	.....	.....	4.00	.....	4.00	.....	255
Pine Tree	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Plymouth	.....	.....	.....	.....	.....	.....	.16	.....	.....	.....	.....	.....	500
Quincy	.....	.....	45.25	.....	45.00	.....	45.38	.....	45.25	45.00	44.00	.....	212
Ridge	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Robinson	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.61	.....	100
San Pedro	.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.57½	.....	700
S'ra Nevada	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.00	.....	100
S'ra Grande	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Islet	.....	.....	.....	.....	.....	.....	3.00	.....	2.88	.....	3.00	.....	230
Silver King	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Simpson Gd	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
So. Pacific	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.05	.....	500
Standard	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
State Line Nos. 2 & 3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sullivan	1.38	1.25	1.31¼	1.25	1.25	.....	1.25	.....	1.13	1.00	1.13	.....	1,410
Sutro Tun	.....	.....	.....	.....	.21	.....	.....	.....	.....	.....	.....	.....	300
Sycamore	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Twin Lead	.11	.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,300
Vizina	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

PHILADELPHIA MINING STOCKS.

	April 20.		April 21.		April 23.		April 24.		April 25.		April 26.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
American	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Argent	.19	.18	.19	.18	.18	.....	.18	.....	.19	.18	.....	.....	7,600
Arizona So	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Aztec	.....	.....	.04	.....	.04	.....	.04	.....	.04	.....	.....	.....	8,400
Battle Mt	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Black Sul	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bodie	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buena	.03	.....	.03	.....	.....	.....	.03	.....	.....	.....	.03	.....	12,800
California	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calista	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cincinnati	.10	.....	.12	.10	.12	.....	.12	.11	.....	.....	.....	.....	32,700
Compromi'e	.....	.....	.....	.....	.....	.....	.27½	.....	.25	.....	.....	.....	4,300
Contention	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dauntless	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Del Monte	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denver City	.....	.....	.....	.....	.....	.....	.....	.....	.15	.....	.....	.....	100
Fairview	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eureka	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Girard	.....	.....	.10	.....	.10	.....	.10	.09	.10	.....	.10	.....	24,000
Golconda	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Golden Age	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Governor	.09	.08	.09	.08	.09	.....	.09	.....	.....	.....	.07	.....	18,800
Grand Uni'n	.24	.....	.....	.....	.25	.20	.24	.....	.....	.....	.....	.....	11,650
Gunnison	.62½	.57½	.60	.....	.60	.57½	.62½	.60	.65	.62½	.67½	.65	17,500
Hancock	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iowa Gulch	.09	.08	.08	.....	.08	.....	.08	.07	.08	.07	.08	.....	50,000
King Bul'on	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ledger Con	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Dia'd	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.05	.....	5,500
Little Maud	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
L'g & D'y Hl	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
McCullough	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Magnolia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montana	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mt. Lincoln	.01	.....	.01	.....	.....	.....	.01	.....	.....	.....	.....	.....	10,200
Mt.Sheridan	.....	.....	.....	.....	.04	.....	.....	.....	.05	.....	.....	.....	5,300
National	.....	.....	.02	.....	.....	.....	.....	.....	.02	.....	.....	.....	10,000
Orion	.....	.....	.06	.....	.06	.....	.06	.....	.....	.....	.05	.....	3,500
Orion Pref	.....	.....	.....	.....	.....	.....	.09	.....	.09	.....	.....	.....	700
Palmetto E	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pembina	.15	.14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,100
Penn-Breck	.13	.12	.14	.13	.13	.....	.14	.13	.13	.....	.....	.....	15,500
Permanent	.02	.....	.....	.....	.....	.....	.....	.....	.03	.....	.....	.....	6,100
Pizarro	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pizarro Ex	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Wrought Pipes and Tubes.—A further decline has taken place in prices, and discounts are given at 70 off for steam pipes, and boiler tubes at 57½c.

Sheet-Iron.—Sheet-iron is selling in retail lots at 4@4½c., and buyers of large lots are waiting for lower prices. Stocks at mill are not permitted to accumulate, and the production is kept within bounds. Galvanized is from 35 to 40 per cent off. A large amount of business is looked for.

Structural Iron.—Sales of 3000 tons of structural iron were made this week for bridges, and additional work is under negotiation which will be placed probably next week. Steel for structural purposes is firmer than usual, and orders for angle-iron were secured at 2·50c. Tees, 3·20c. The combination price for Channels and Beams is 3½c.

Plate and Tank Iron.—An improving activity has been developed in plate and tank, though some manufacturers complain of very dull trade. Competition is active, but, as the volume of business is not sufficient to keep all mills active, there is necessarily some complaint upon the part of unsuccessful bidders.

Steel.—Steel rails are active at $39@$40 in small lots.

Old rails have scarcely any activity, and are quoted nominally at $24. Tees $27.50 for Double-Heads, and occasional sales of American are made at $23.50@$24.

Scrap-Iron.—Transactions at yard this week were at about $26 for No. 2 and $27 for No. 1.

Pittsburg. April 26.

The Western Pennsylvania iron market has been unsettled by the recent failure, and by the reduction of $2 per ton on Foundry iron in the East. If 60,000 tons of iron are thrown upon the market, even with the greatest care, it can not help to depress prices. Nothing has been decided yet. Consumers are fighting, and will not purchase except for immediate requirements. Small sales have been made at $21.50 for No. 1 Foundry, $19 for Gray Forge, and $22.50 for Bessemer. Concessions have been made on these prices for spot cash; but in view of the downward tendency, holders of crude iron report great difficulty in disposing of it. Another obstacle in the way of business is the uncertainty as to the action of the iron-workers. The manufacturers have submitted their ultimatum, which is, that, unless the workmen accept a reduction of wages of one dollar per ton, when the selling price of iron is 2 cents per pound, they will close their mills. This policy was agreed upon several weeks ago, but it is hinted that the workmen will be given another chance. Several lodges have taken action and decided to strike, but there is plenty of time between this and the 2d of June for a sober second thought. A suspension is desired by the manufacturers, especially as, under the organization made a year ago, suspension can be maintained without injury to the trade. The Western manufacturers are in excellent shape to stand any suspension, voluntary or forced upon them. The demand for finished iron is only moderate, and selling prices have declined to 1.90c.; even lower rates have been heard of, and if maximum production is kept up, still lower prices will be inevitable. Gray Forge is declining, and mill requirements are filled from week to week. The lake ore companies are still holding back, and furnace companies purchase season requirements at present figures. Steel rails are selling at $39@$40. Merchant steel is in moderate demand in small lots. Old rails are fluctuating, and offers are made at tidewater, but not accepted. Nails are selling at $3 in car load lots, and the demand for building purposes is active.

Cleveland. April 25.

The situation of last week remains unchanged in the main, more strength being developed in some sections and weakness in others. Good brands command fair prices, and off grades are not much in demand by the trade, and consequently in this grade some cutting is being done.

No. 1 Bessemer	$23.00@$24.00
" Foundry, all ore	22.00@ 23.50
" Foundry, cinder mixture	21.00@ 22.50
" Soft Foundry	20.00@ 21.00
" Open silvery	19.00@ 20.00
Mill Irons	19 00@ 20.00
Four months, f. o. b. cars Cleveland:	
Nos. 1 and 2 Charcoal	26 00@ 27.00
Nos. 3, 4, 5, and 6 Charcoal	26.50@ 28.00
Hanging Rock Charcoal	25.00@ 28.00
Strictly Cold-Blast Charcoal	30.00@ 32.00
Four months, f. o. b. cars Cleveland:	
Bessemer ores	7.00@ 8.50
Hematite "	5.00@ 6.00

COAL TRADE REVIEW.

NEW YORK, Friday Evening, April 27.

Anthracite.

We can not note any change for the better in the anthracite coal trade. Individual operators and middlemen are selling practically for what they can get, and there is quite a good deal of buying on the part of cautious consumers. The companies are maintaining an attitude of firmness, so far as appears on the surface. The only piece of more important news which we hear is, that one of the companies has taken the contract with the Pacific Mills, 35,000 tons, broken, delivered, screened, on cars, during any time of the year at Salem or Newburyport, for $5 a ton, a very low figure.

A reliable correspondent sends us the following from Philadelphia, under date of April 26th:

The local trade is dull. It is generally so at this time of the year, but not to the same extent, and the present dullness is greatly due to the effort to maintain the winter prices, which give no inducement to dealers or consumers to anticipate their wants. It is to be hoped that this mistake will be corrected to-morrow, when the city and line prices are to be fixed for May month.

Orders for shipments are also coming slower than they should at this season, and after a long winter, leaving no over-stock in the yards or cellars.

Nothing has yet been decided about curtailment for the early part of May. It is believed that some restriction must take place until coal sets moving West, which will be as soon as lake navigation opens.

Vessels are scarce, and the rates of freights the same—$1.25@$1.30 to Boston and Portland.

The following prices were fixed upon at the meeting of the Western Anthracite Joint Association:

	Buffalo, Pittsburg, Salamanca, and Bridges on cars.	Buffalo. f. o. b.	Rochester.	Syracuse.
Grate	$4.80	$5.10	$4.45	$4.20
Egg	4.90	5.20	4.55	4.30
Stove	5.15	5.45	4.80	4.55
Chestnut	5.15	5.45	4.80	4.55
Pea	3.65	...	3.30	3.05
No. 4	5.40	5.70	5.05	4.80

Bituminous.

It now appears that a number of railroad contracts have been closed, generally we hear at unprecedentedly low figures. Among those of which we have heard are the New York Central, 120,000 tons, to two Cumberland companies; the New York & New England, 100,000 tons, to Clearfield parties; the Boston & Lowell, 40,000 tons, to Cumberland and Clearfield operators; and the Boston & Providence, 20,000 tons, to a Cumberland firm. There are others pending, but so far as we can learn, not closed.

The statement has been made that bituminous coal had sold as low as $4 per ton. In explanation of this, it may be stated that this has been done to frustrate any heavy purchases abroad for the steamer trade, and covers this year's delivery. We quote Clearfield alongside $4.20@$4.50 and Cumberland $4.30@$4.60, according to quality.

STATISTICS OF COAL PRODUCTION.

The Transportation of Coke over the Pennsylvania Railroad for the week ended April 21st and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	2,293	38,014
West Penn. RR	2,071	31,959
Southwest Penn. RR	42,660	594,141
Penn. & Westmoreland Region, Pa. RR	5,878	74,557
Pittsburg, Penn. RR	...	274
Snow Shoe (Clearfield Region)	760	5,372
Total	53,662	744,417

Horsford's Acid Phosphate

In Despondency, etc.

DR. W. S. POWELL, Defiance, O., says: "I have used it with satisfactory results in dyspeptic ailments associated with great mental depression or despondency."

DIVIDENDS.

SAN FRANCISCO, April 14, 1883.

THE FATHER DE SMET CONSOLIDATED Gold Mining Company has declared dividend No. 27 of TWENTY CENTS per share, payable at the office of Laidlaw & Co., 14 Wall Street, New York, on the 30th inst. Transfer books will close on the 23d.

H. DEAS, Secretary.

NEW YORK, April 13, 1883.

THE CONTENTION CONSOLIDATED MINING COMPANY has declared its regular monthly dividend, No. 15, of

TWENTY-FIVE CENTS PER SHARE,

payable April 28th, 1883, at the office of the Farmers' Loan and Trust Company, No. 26 Exchange Place, on all stock registered in New York.

Transfer-books close on April 18th.

W. HART SMITH, Vice-President.

A. H. McNEAL,

Office and Works, - - - - Burlington, N. J.

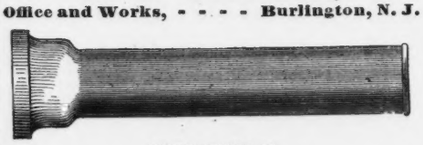

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Fig 2

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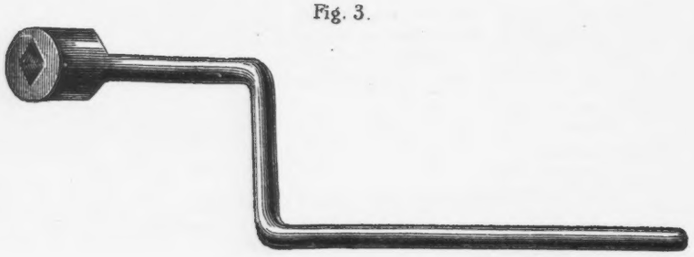
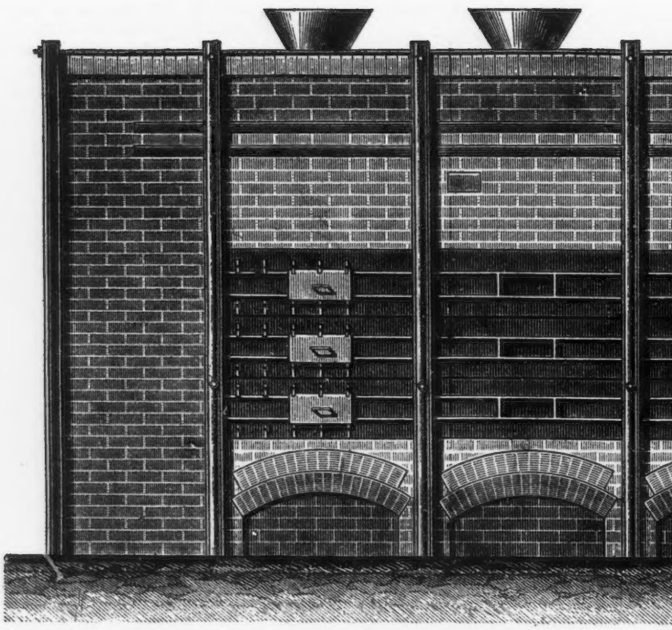


Fig. 4.

Fig. 5.

Fig. 6.

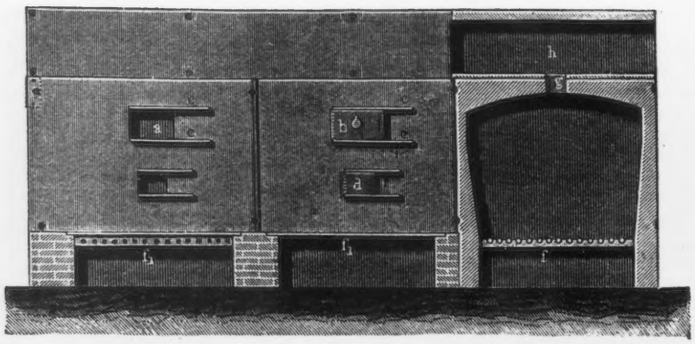


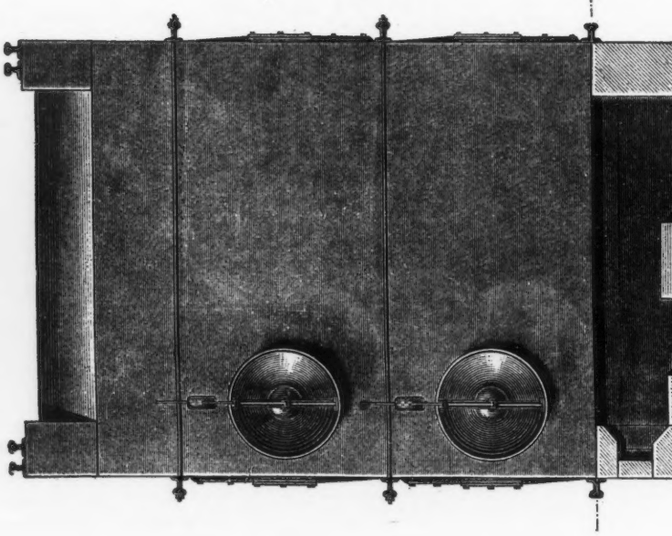
Decim.
9 8 7 6

View from above.

Section

Fig. 7.





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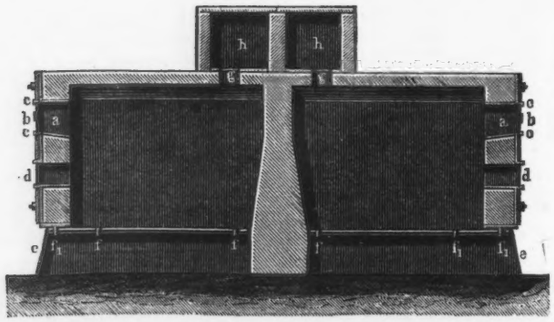


Section through *a a.*

Secti

Fig. 9

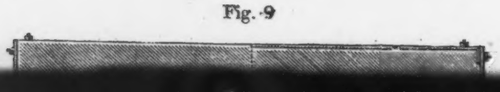
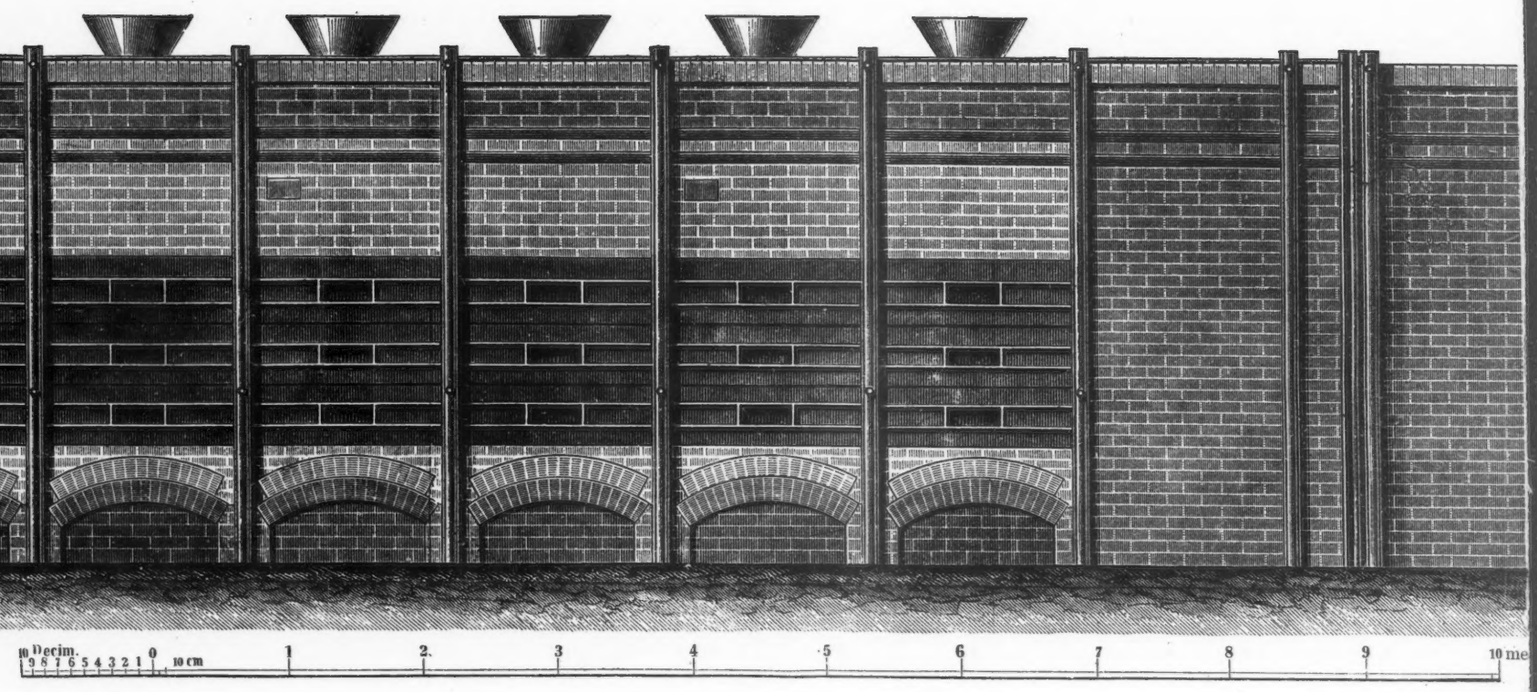


Fig. 13.

Front elevation.



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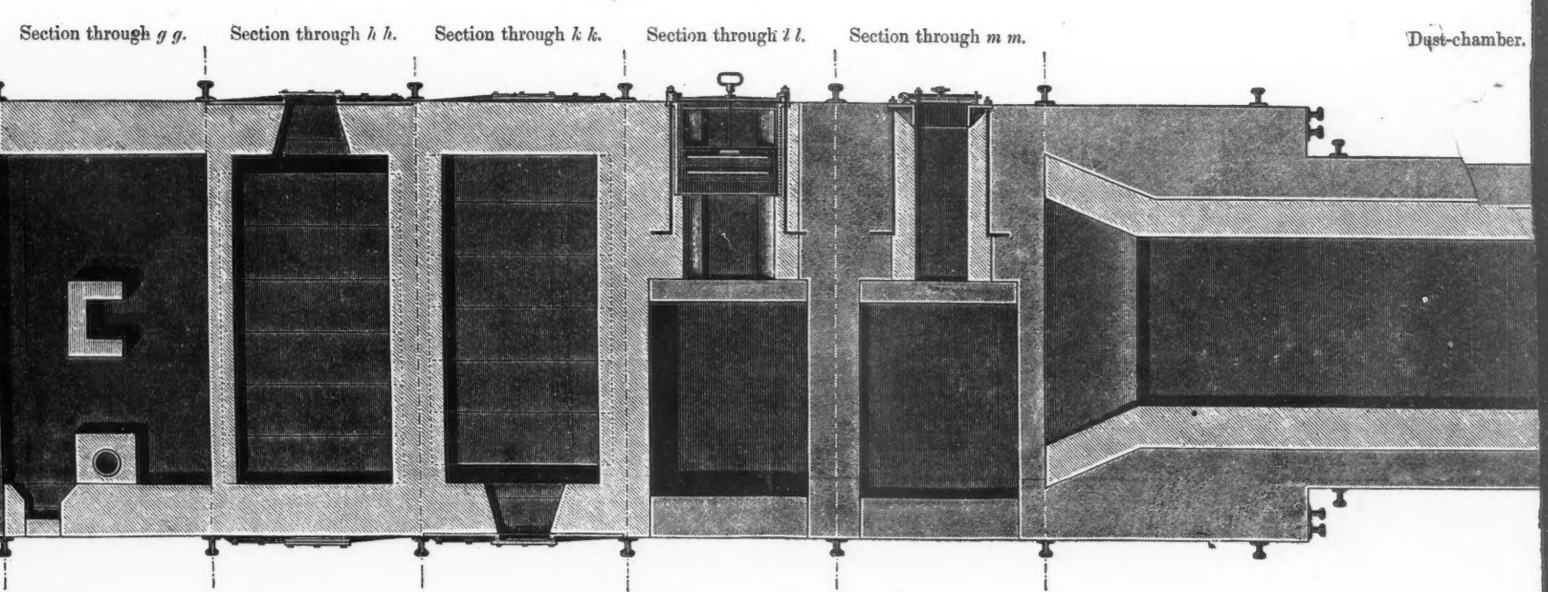
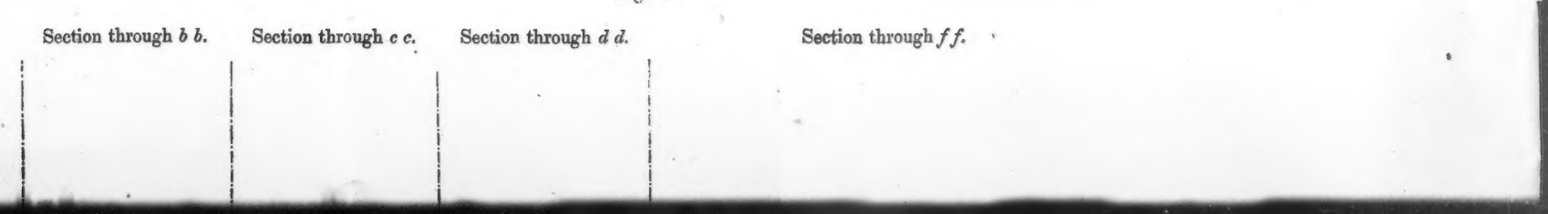


Fig. 15.



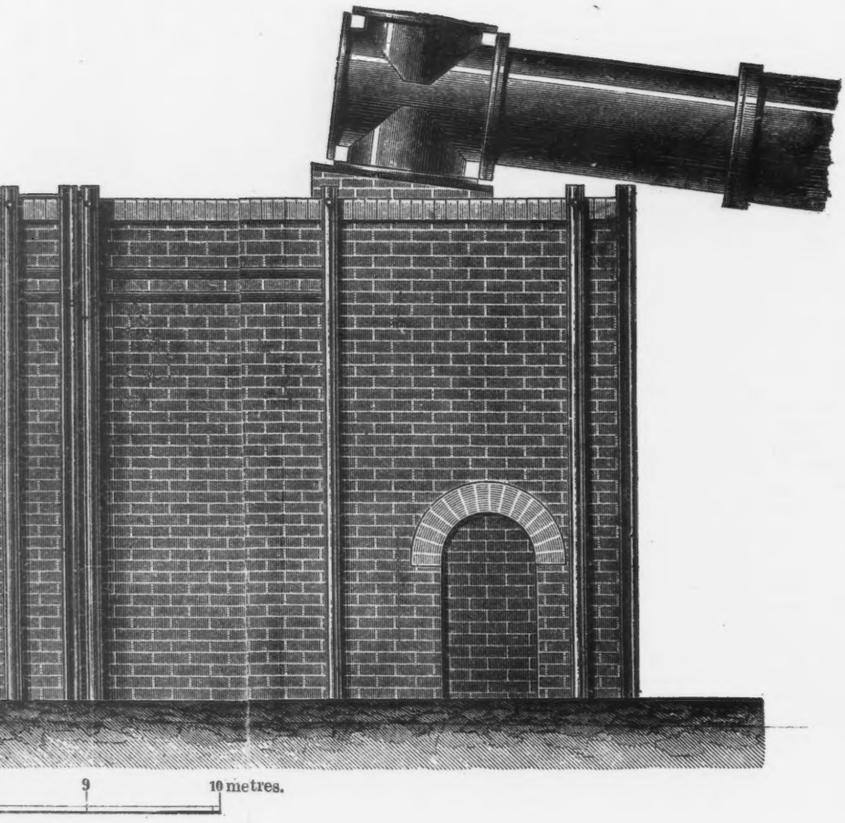
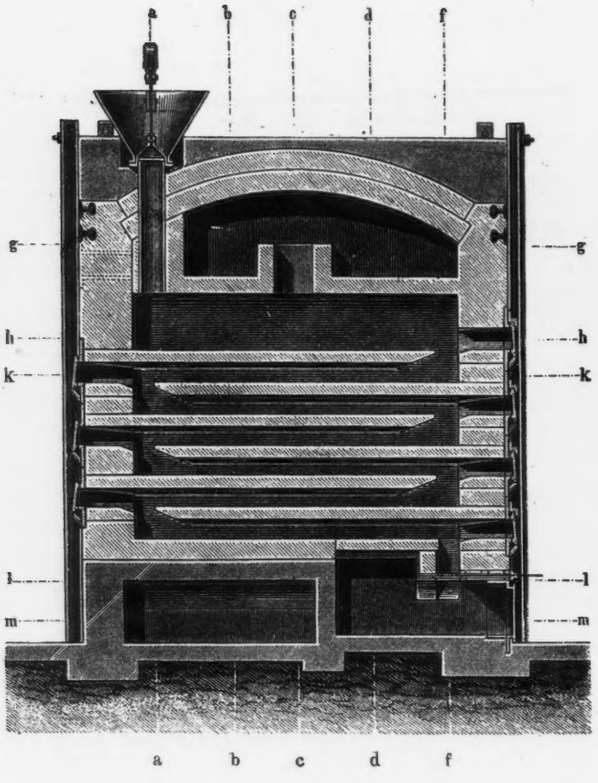


Fig. 16.

Section through A B.



Dust-chamber.

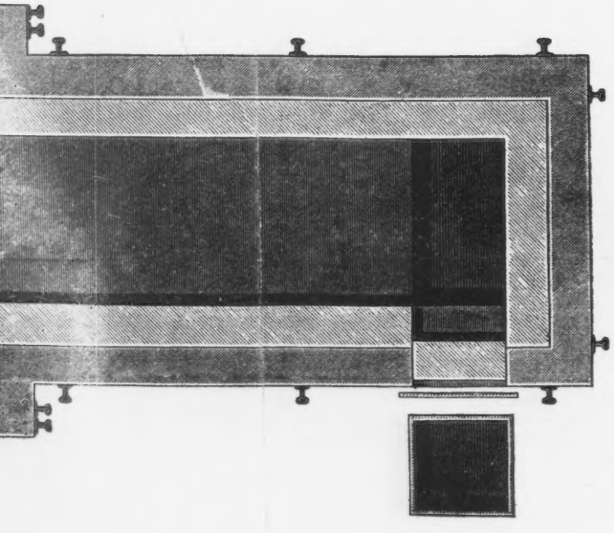


Fig. 11.

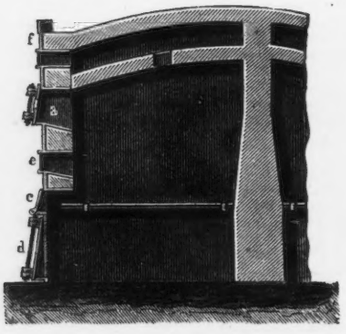


Fig. 18.

Fig. 12.

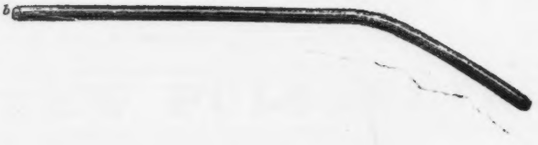


Fig. 17.

Section through C D.

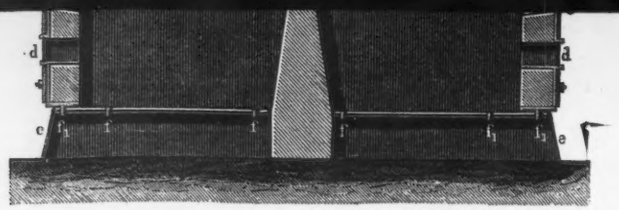


Fig. 9

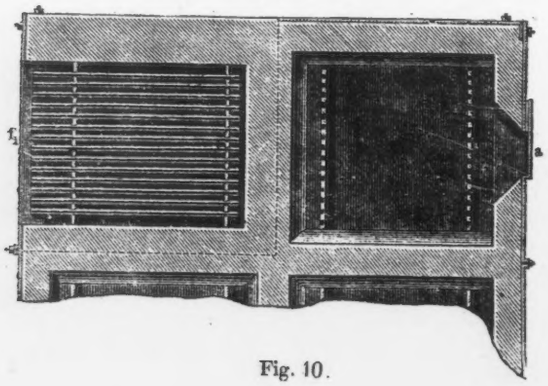
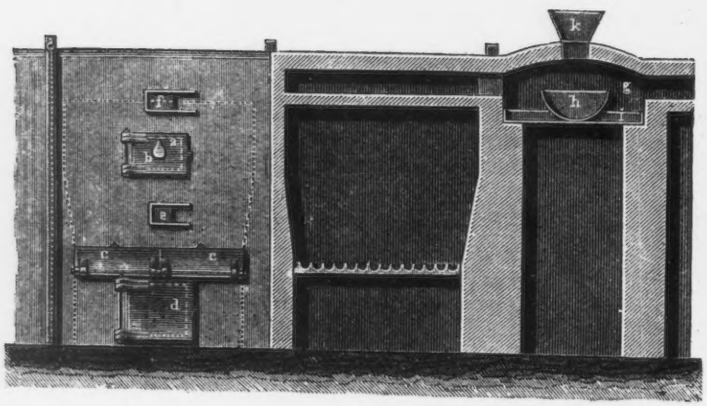


Fig. 10.

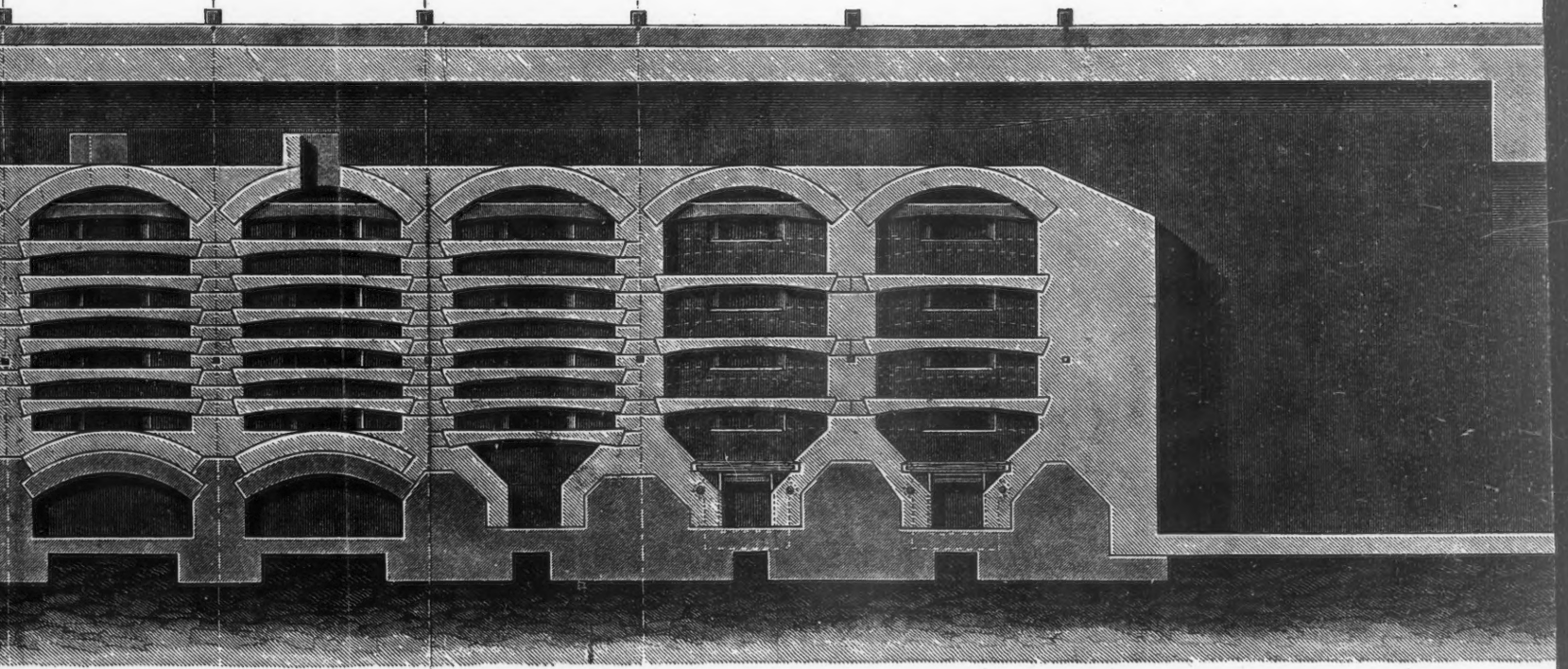


Section through *a a.*

Sectio

Fig. 15.

Section through *b b*. Section through *c c*. Section through *d d*. Section through *f f*.



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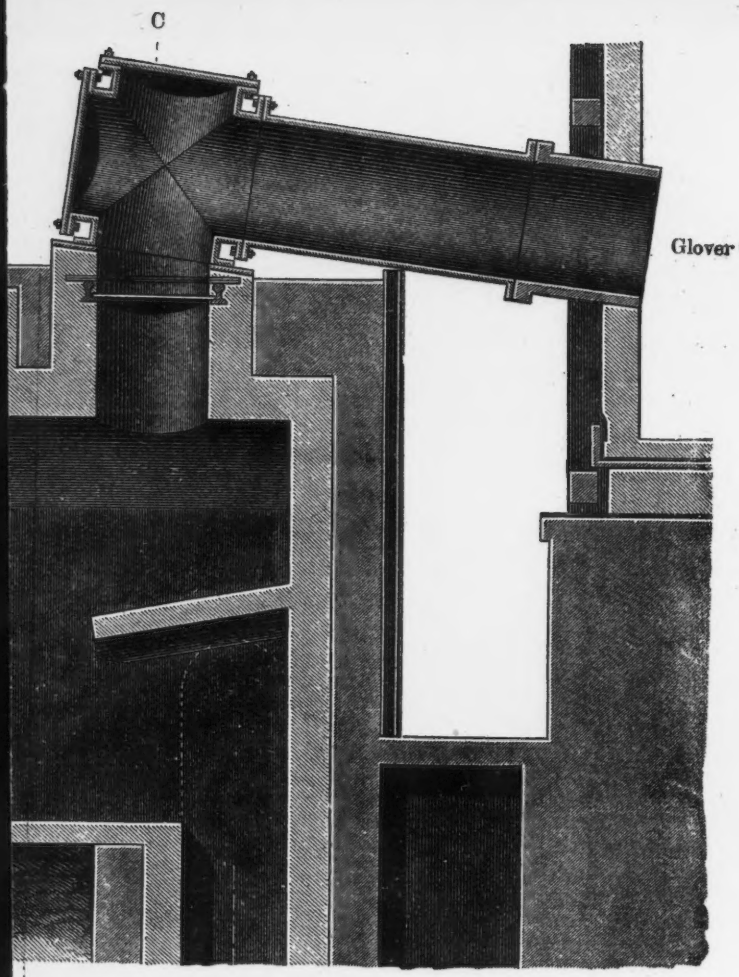

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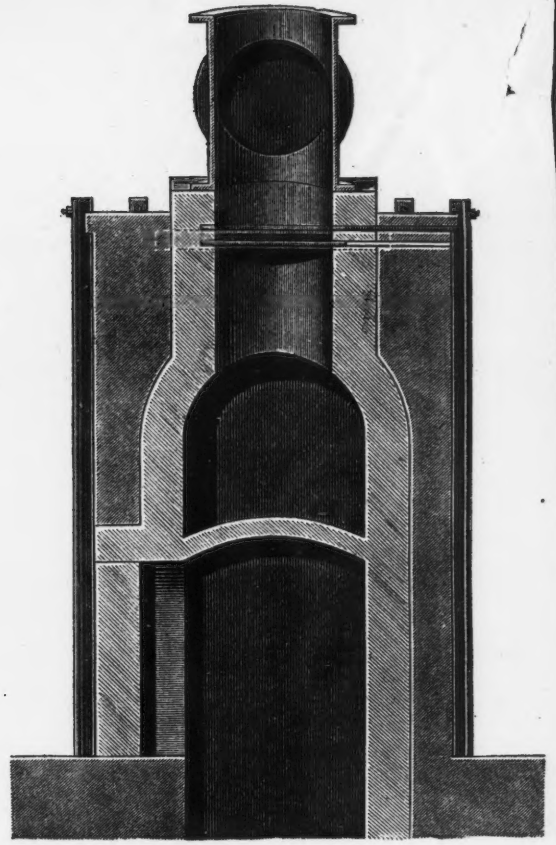
Section through C D.

lover tower.



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